Appendix A- ASSETS AND FREIGHT FLOW TECHNICAL MEMO

Assets and Freight Flow

This technical memorandum provides an inventory of the existing freight assets and freight flows. The inventory includes all modes of freight transportation; highway, rail, air, water, and pipeline. It also includes an inventory of intermodal facilities where the different modes interact to exchange freight and the freight generators located within Missouri. For each of the modes of transportation a discussion of freight flows and forecasts is provided.

Introduction

Freight movement provides many economic benefits to the State through the shipment of parts to support production done in Missouri by Missouri workers, as well as, through the shipment of finished products moved both into and out of the State. The economic vitality of the State relies on transportation of goods into, out of, within, and to a lesser extent through Missouri to support jobs and growth throughout the State.

The production and transporting goods are key elements to the economic vitality of Missouri. The top ten occupations in Missouri for 2012 are shown in **Table A-1**. Two key occupations (Production and Transportation) are listed for 2012. Production is at number four with 188,170 employees and Transportation at number six with 176,490 employees.

Table A-1: 2012 Top Ten Occupations in Missouri

Top Ten Occupations in Missouri (2012)	
Occupation	**Employees**
Office and Administrative Support	434,790
Sales	264,150
Food Preparation	244,770
Production	188,170
Healthcare	179,390
Transportation	176,490
Education	150,510

Management	131,960
Financial	121,220
Installation and Maintenance	103,200

Source: U.S. Bureau of Labor Statistics

Appendix A: Assets and Freight Flow Technical Memo

As Missouri's population grows the demands for goods will follow, requiring more goods to be transported into or within the State. According to Woods and Poole Economic data in **Table A-2,** Missouri is expected to have an annual growth rate of 0.62 percent from 2012 to 2040. This results in over a million additional Missourians by 2040. The ten fastest growing counties by annual growth rate are shown in **Table A-2.**

Table A-2: Top 10 Fastest Growing Missouri Counties

Top 10 Fastest Growing Missouri Counties

County	2012 Population	2040 Population	Annual Growth Rate
Christian	79,824	143,530	2.12%
Platte	92,054	163,260	2.07%
Cass	100,376	171,910	1.97%
Clay	227,577	358,420	1.64%
Boone	168,535	263,150	1.60%
Lincoln	53,354	79,870	1.45%
Newton	59,069	86,110	1.36%
Taney	52,956	76,300	1.31%
Greene	280,626	397,020	1.25%
St. Charles	368,666	517,450	1.22%

Source: Woods and Poole Economics

Missouri follows national trends of population growth in and around urban counties with less growth or negative growth in rural counties. By 2040, Missouri population is estimated to be over 7 million people. **Table A-3** shows the most populous counties are expected to include:

Table A-3: Highest Projected 2040 Population by County

Highest Projected 2040 Population by County

County	2012 Population	2040 Population	Annual Growth Rate
St. Louis	1,000,438	1,050,850	0.18%
Jackson	677,377	682,610	0.03%
St. Charles	368,666	517,450	1.22%
Greene	280,626	397,020	1.25%
Clay	227,577	358,420	1.64%
Jefferson	220,209	295,380	1.05%
Boone	168,535	263,150	1.60%
St. Louis City	318,172	246,080	-0.91%
Cass	100,376	171,910	1.97%
Platte	92,054	163,260	2.07%

Source: Woods and Poole Economics

Freight System Assets

This section provides an inventory of Missouri's major freight system assets for each mode of freight transportation, including highway, rail, air, water, and pipeline. In addition to the inventory for each mode, an inventory of intermodal facilities and freight generators is also provided.

Highway

Missouri has the seventh largest state highway system in the United States (U.S.). It is made up of 33,700 miles of roadway, 5,500 miles of which are classified as heavily traveled "major highways" and 28,200 miles of which are defined as lesser traveled "minor highways."[1] Missouri's major highways encompass just 20 percent of the state highway miles but carry 80 percent of the system's traffic. **Table A-4** lists the miles of Missouri's heavily traveled "major highways" by functional classification.

Table A-4: Miles of Missouri's Major Highways by Functional Classification

Miles of Missouri's Major Highways by Functional Classification

Functional Classification	Centerline Miles
Freeway	1,357
Interstate	1,385
Local	0
Major Collector	5
Minor Arterial	36
Principal Arterial	2,736
Total	5,519

Source: A Vision for Missouri's Transportation Future, MoDOT, 2014

National Highway System

The National Highway System (NHS) comprises approximately 160,000 miles of roadways important to the nation's economy, defense, and mobility.[2] The NHS was developed by the U.S. Department of Transportation in cooperation with states, municipalities, and metropolitan planning organizations (MPOs). The NHS includes the Interstate Highway System and the Strategic Highway Network (STRAHNET). The STRAHNET is a system of public highways that provides access, continuity, and emergency capabilities for military personnel and equipment. Other principal arterials and connector routes are also part of the NHS. In all, the NHS includes:

- Interstates
- Other principal arterials in rural and urban areas which support the interstate system by providing access to and from freight generators, major port, airport, public transportation facility, or other intermodal transportation facility

[1] A Vision for Missouri's Transportation Future, MoDOT, 2014
[2] FHWA.com

- The STRAHNET is a network of highways which have been identified as important for U.S. strategic defense policy
- Major strategic highway connectors which provide access between major military installations and the STRAHNET
- NHS designated intermodal connectors which provide access between major intermodal facilities and the NHS.

Figure A-1 shows the nearly 5,900 miles of NHS facilities in Missouri.

Interstate Highways

There are 18 Interstate Highways within Missouri, including nine main routes and nine auxiliary routes. These are listed in **Table A-5** and shown in **Figure A-1**. Interstate main routes are one or two digit numbered routes, while the auxiliary routes are three digit circumferential routes serving urban areas. The central location of Missouri benefits the transportation of freight as the interstate system located in Missouri provides national access to a vast majority of the nation. **Figure A-2** shows the national extent of the Interstates in Missouri.

Interstate 29

I-29 is located within four States including Missouri, Iowa, South Dakota, and North Dakota. It is approximately 557 miles in length running from I-35/I-70 in Kansas City, Missouri to the Canadian border near Pembina, North Dakota, where it becomes Manitoba Highway 29 and connects to Winnipeg, Manitoba. I-29 connects to five major Interstates: I-70, I-35, I-80, I-90, and I-94.

Within Missouri, I-29 runs approximately 125 miles from its southern terminus at I-35/I-70 to the Iowa border. I-29 serves the metropolitan areas of Kansas City and St. Joseph.

Interstate 35

I-35 stretches from Laredo, Texas to Duluth, Minnesota, traversing a distance of roughly 1,570 miles. I-35 connects six states including Missouri. It is one of the most important freight corridors in the U.S. and provides access to North American Free Trade Agreement (NAFTA)-related international transborder freight at the Laredo, Texas port of entry. I-35 connects to 12 major Interstates: I-10, I-37, I-20, I-45, I-30, I-40, I-44, I-29, I-70, I-80, I-90, and I-94.

I-35 has a length of approximately 114 miles through Missouri, from the Kansas border at its southern terminus in Kansas City, Missouri to the Iowa border. Within Missouri, I-35 intersects I-670, I-70 and I-29. I-35 serves the metropolitan areas of Kansas City.

Interstate 44

I-44 is located within three states including Texas, Oklahoma and Missouri. It is approximately 633 miles in length running from Wichita Falls, Texas to St. Louis, Missouri. I-44 connects to five major Interstates: I-40, I-35, I-49, I-55, and I-70.

Within Missouri, I-44 runs approximately 290 miles from its southern terminus at the Oklahoma border to its eastern terminus at the Illinois border. I-44 serves the metropolitan areas of Joplin, Springfield, and St. Louis.

Interstate 49

I-49 is a Federal Highway Administration (FHWA)-designated High Priority Corridor and is currently located within two States, Louisiana and Missouri. Between Louisiana and Missouri, it runs through Arkansas, but is not designated as an interstate in Arkansas. Approximately 208 miles currently exists between Lafayette, Louisiana and Shreveport, Louisiana.

Within Missouri, I-49 runs approximately 180 miles from its southern terminus north of the Arkansas border to its northern terminus in Kansas City, Missouri. I-49 serves the Joplin and Kansas City metropolitan areas. Missouri's remaining section is the connection to the Bella Vista bypass.

Interstate 55

I-55 extends approximately 964 miles from I-12 in New Orleans, Louisiana to Chicago, Illinois. I-55 serves six states including Louisiana, Mississippi, Arkansas, Tennessee, Missouri, and Illinois. I-55 connects to 14 major Interstates: I-10, I-12, I-20, I-40, I-57, I-44, I-64, I-70, I-72, I-74, I-80, I-39, and I-90/94.

Within Missouri, I-55 runs approximately 210 miles from its southern terminus at the Arkansas border south of Sikeston to St. Louis. I-55 is the easternmost Interstate in Missouri. I-55 parallels the Mississippi River and serves Sikeston, Cape Giradeau, and the St. Louis metropolitan area.

Interstate 57

I-57 terminates at I-55 near Sikeston, Missouri. It runs approximately 386 miles from I-55 in Missouri to its northern terminus in Chicago, Illinois. I-57 connects to seven major Interstates: I-24, I-64, I-70, I-72, I-74, I-80, and I-94.

Within Missouri, I-57 runs approximately 22 miles from I-55 to the Illinois border. I-57 serves Sikeston.

Interstate 64

I-64 extends approximately 903 miles from Portsmouth, Virginia to I-70 at Wentzville, Missouri. I-64 serves six states including Virginia, West Virginia, Kentucky, Indiana, Illinois, and Missouri. I-64 connects to 12 major interstates: I-95, I-81, I-77, I-79, I-75, I-71, I-65, I-69, I-57, I-55, I-44, and I-70.

Within Missouri, I-64 runs approximately 40 miles from the Illinois border to its western terminus at I-70 in Wentzville. I-64 serves the St. Louis metropolitan area.

Interstate 70

I-70 extends approximately 2,153, miles from near Baltimore, Maryland to Cove Fort, Utah. I-70 serves 10 States including Utah, Colorado, Kansas, Missouri, Illinois, Indiana, Ohio, West Virginia, Pennsylvania, and Maryland. I-70 connects to 20 major Interstates: I-68, I-81, I-99, I-79, I-76, I-77, I-71, I-75, I-74, I-69, I-65, I-57, I-55, I-64, I-44, I-35, I-29, I-25, I-76 and I-15.

Within Missouri, I-70 runs approximately 251 miles from the Illinois border in St. Louis to the Kansas border in Kansas City. I-70 connects the two largest metropolitan areas in Missouri, St. Louis and Kansas City. In addition, I-70 serves the Columbia metropolitan area.

Interstate 72

I-72 terminates at US-61 in Hannibal, Missouri. It runs approximately 180 miles from Hannibal, Missouri to its eastern terminus in Champaign-Urbana, Illinois. I-72 connects to two major Interstates: I-55 and I-57.

Within Missouri, I-72 runs approximately two miles from US-61 to the Illinois border. As part of a High Priority Corridor, it is possible that US-36 could be converted to interstate standards which would extend I-72 across Missouri to St. Joseph.

Interstate 155

I-155 is a freeway connection between I-55 near Caruthersville and I-69 in western Tennessee. It is approximately 11 miles in length.

Interstate 170

I-170 is the inner freeway connection between I-270 and I-64 in St. Louis and is approximately 11 miles in length.

Interstate 229

I-229 is the freeway loop serving St. Joseph and is approximately 15 miles in length. It connects to I-29 at both the northern and southern termini.

Interstate 255

I-255 is a partial freeway loop around St. Louis and is approximately four miles in length. It provides connections to I-55 and I-70 in Illinois.

Interstate 270

I-270 is a partial freeway loop around St. Louis. It runs approximately 36 miles from I-55, looping around the west and north sides of the St. Louis metropolitan area and enters Illinois.

Interstate 435

I-435 is a full freeway loop around Kansas City. It runs 56 miles in Missouri from the Kansas border/Missouri River north to I-29, travels generally east, turns south and turns back to the west and leaves Missouri at the Kansas border in the southern portion of the Kansas City metropolitan area.

Interstate 470

I-470 is a partial freeway loop in the Kansas City metropolitan area. It runs 17 miles from I-70 to I-435 in the southeast portion of Kansas City metropolitan area.

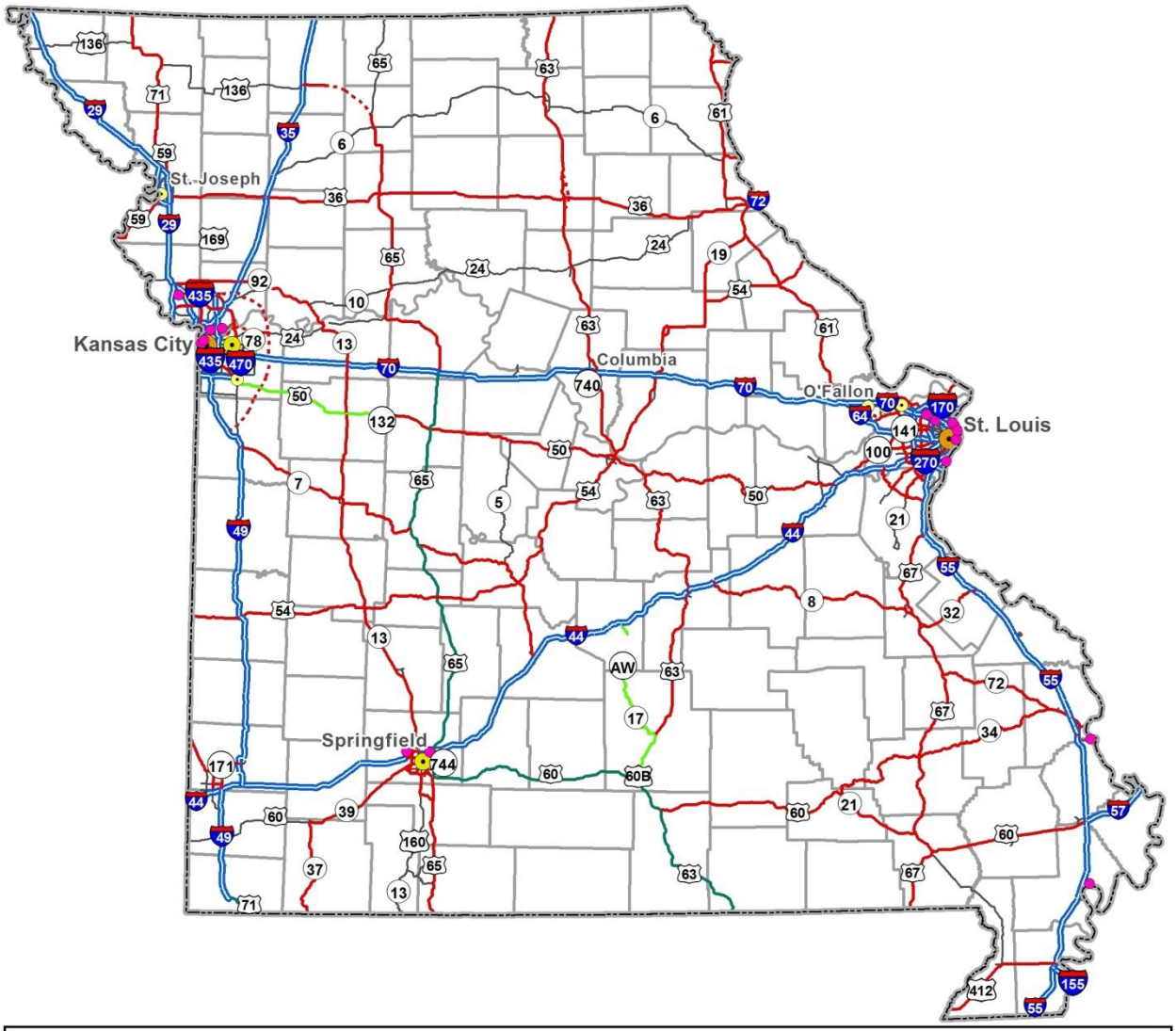
Interstate 635

I-635 is a freeway connector in the Kansas City area. It runs 13 miles from I-35 in Kansas to I-29 on the north. In Missouri, it runs approximately four miles between the Kansas border and I-29.

Interstate 670

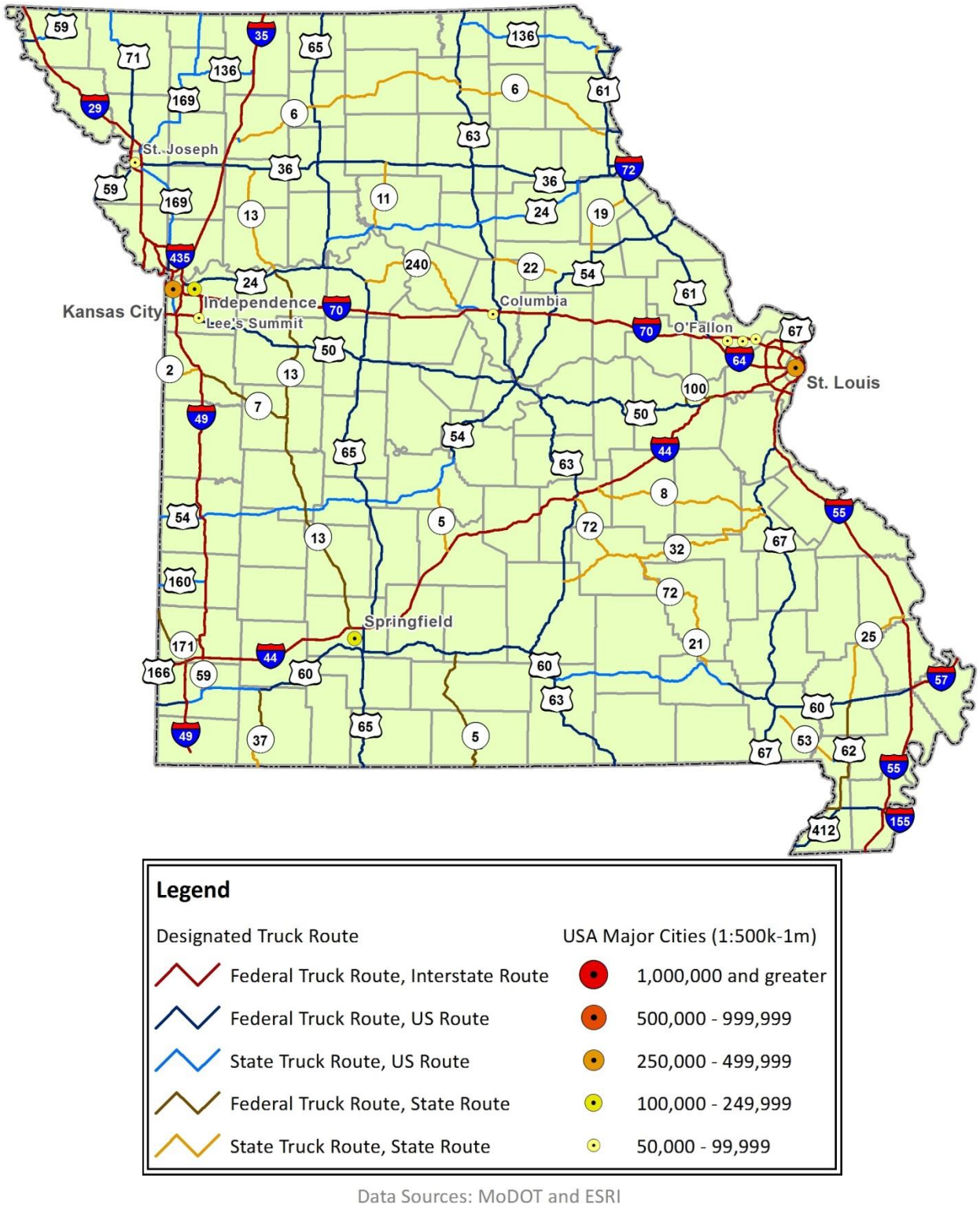
I-670 is a freeway connector skirting the Kansas City, Missouri downtown area. It runs three miles from I-70 near the Kansas City downtown loop and reconnects to I-70 in Kansas. Approximately one mile of I-670 is in Missouri and connects to I-35.

Figure A-1: Missouri National Highway System



Data Sources: USDOT FHWA, MoDOT, and ESRI

Table A-5: Total Miles, Overlap Miles, and Major Cities Served by Missouri Interestate Highways



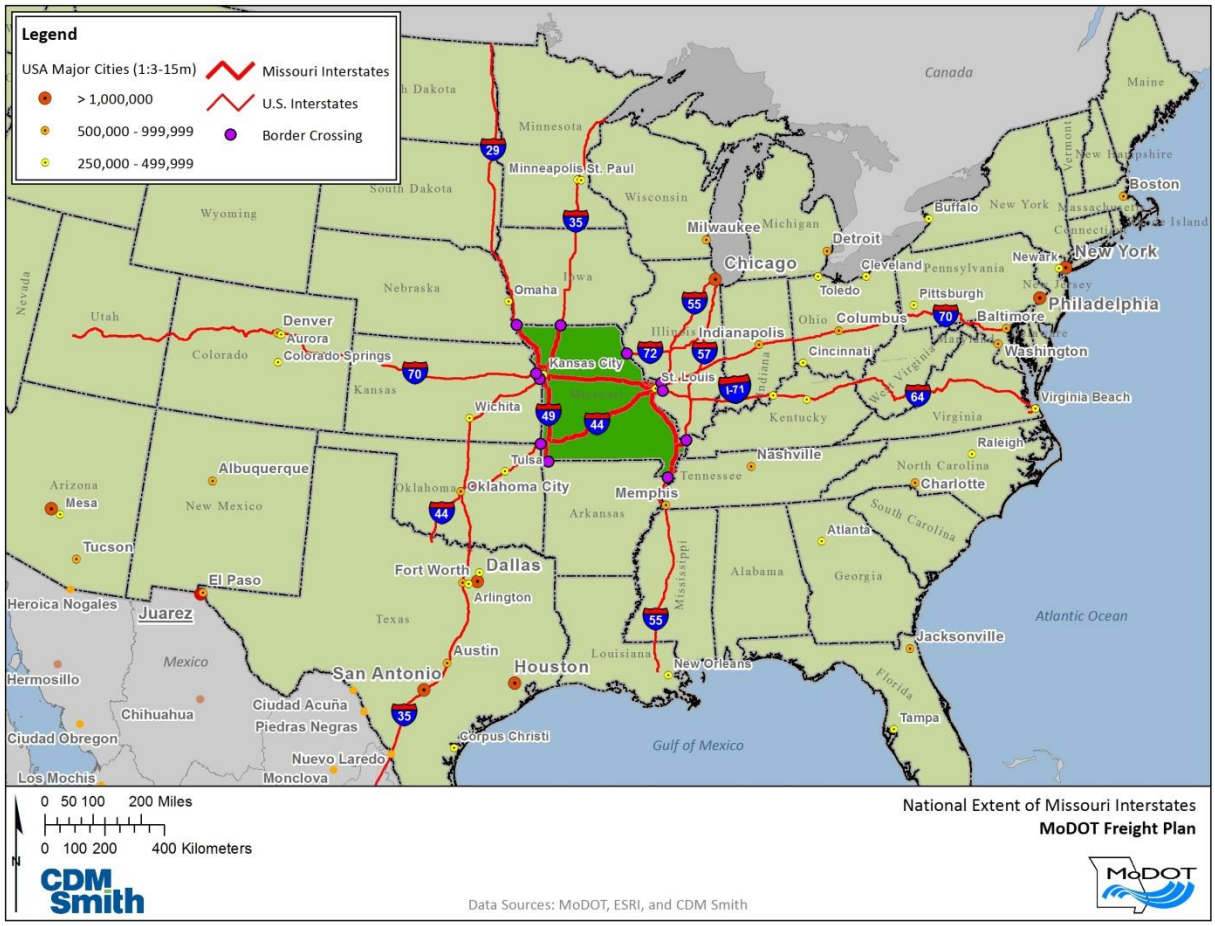
Data Sources: MoDOT and ESRI

Missouri Interstate Highways

	Interstate Route	Total Miles	Overlap Miles	Route	Major Cities Served (population larger than 5,000)
Main Routes	I-29	125.22	5.5	I-35	Gladstone, St. Joseph, Kansas City
	I-35	113.74	1.0	I-70	Kansas City, Liberty
	I-44	290.49	-	-	Crestwood, Eureka, Kirkwood, Lebanon, Marshfield, Rolla, Shrewsbury, Springfield, St. Louis, Sunset Hills, Webster Groves, Wildwood
	I-49	178.96	-	-	Joplin, Kansas City
	I-55	209.45	1.0	I-44	Affton, Arnold, Barnhart, Cape Girardeau, East St. Louis, Festus, Lemay, Mehlville, Perryville, Sikeston
	I-57	21.96	-	-	Sikeston
	I-64	40.50			Brentwood, Chesterfield, Ladue, Lake St. Louis, O'Fallon, Richmond Heights, St. Louis, Town and Country, Wentzville
	I-70	251.66	-	-	Berkeley, Blue Springs, Boonville, Bridgeton, Columbia, Independence, Kansas City, Lake St. Louis, Maryland Heights, O'Fallon, St. Ann, St. Charles, St. Louis, St. Peters, Wentzville
	I-72	2.04	-	-	Hannibal
Auxiliary Routes	I-155	10.84	-	-	Caruthersville
	I-170	11.17	-	-	St. Louis, Hazelwood, Berkeley, Clayton, University City, Richmond Heights
	I-229	14.97	-	-	St. Joseph
	I-255	3.77	-	-	St. Louis
	I-270	35.62	-	-	St. Louis, Florissant, Ferguson, Bridgeton, Kirkwood
	I-435	52.78	-	-	Kansas City, Grandview, Raytown, Independence, Gladstone
	I-470	16.72	-	-	Kansas City, Lee's Summit, Independence
	I-635	3.77	-	-	Kansas City
	I-670	1.17	-	-	Kansas City
TOTAL	18 Routes	1384.83	7.5		

Sources: http://www.fhwa.dot.gov/reports/routefinder/table1.cfm, http://www.fhwa.dot.gov/reports/routefinder/table2.cfm, http://www.fhwa.dot.gov/reports/routefinder/table3.cfm

Figure A-2: National Extent of Missouri Interstates



NHS Intermodal Connectors

"Intermodal connectors" are roadways that tie together the intermodal freight facilities to the national transportation system. Connectors link major freight activity nodes to arterial highway systems and improve the ability of networks to serve ports, rail yards, airports, and other freight intensive nodes efficiently. When designed, maintained, and operated with freight in mind, connector routes facilitate the best use of individual modes and improve the overall efficiency of regional highway networks. Designated NHS connectors are often referred to as the first and last miles of roadway used by truckers to travel between the major highways of the NHS and the nation's ports, rail terminals, and air cargo hubs. A listing of Missouri's currently designated NHS Intermodal Freight Connectors is included in Attachment A.

Missouri Major Highways

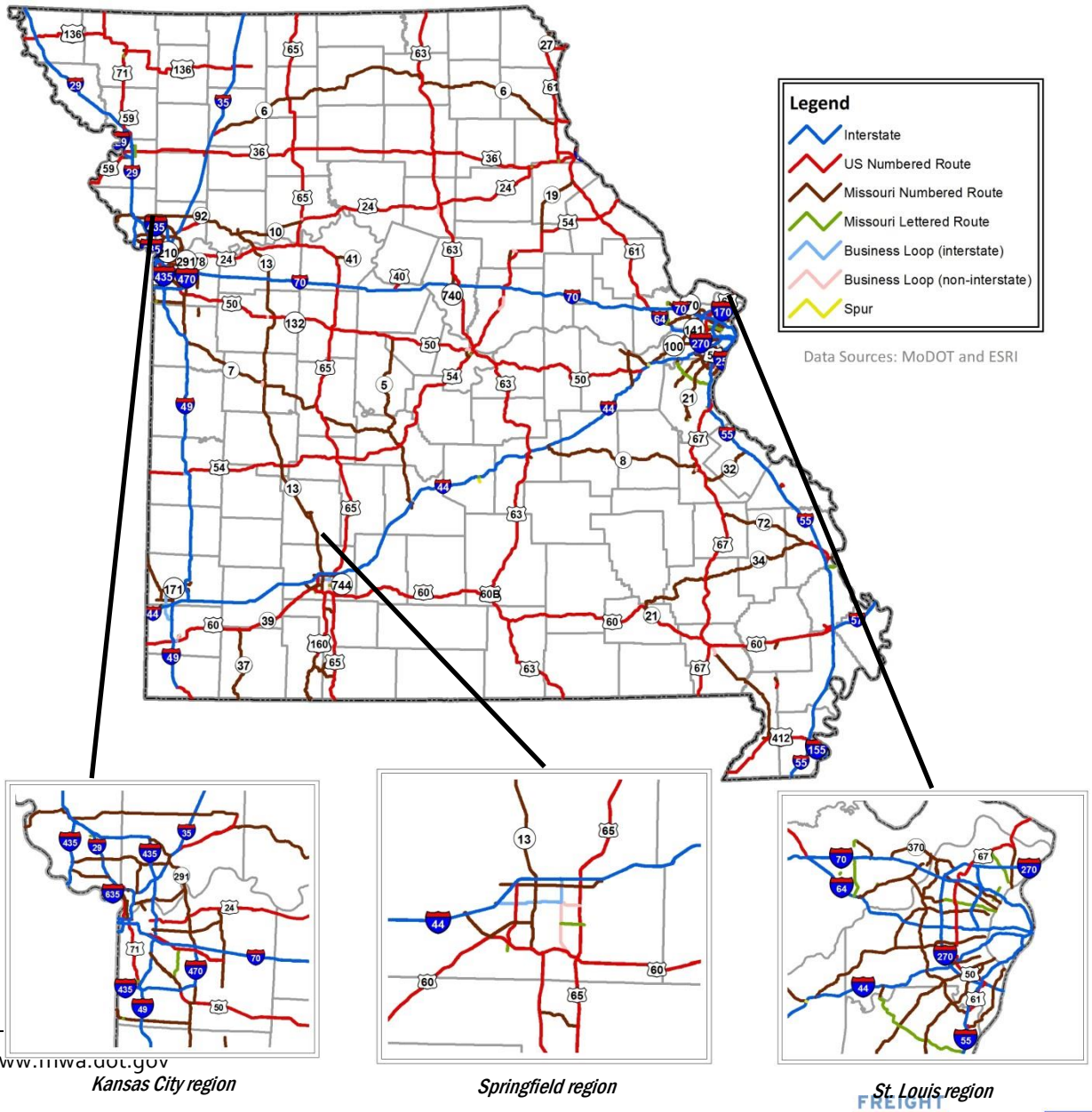
Figure A-3 depicts the Missouri major highway system which defines many of the paths on which freight moves. These major highways include Interstates, U.S. Highways, and most Missouri State Routes. The 28,200 miles of Missouri's State highway system include lesser traveled "minor highways"

that primarily serve local transportation needs. These roads consist mostly of lettered routes, which are often farm-to-market routes, serving as a vital link to the agricultural industry throughout the State.

National Truck Network

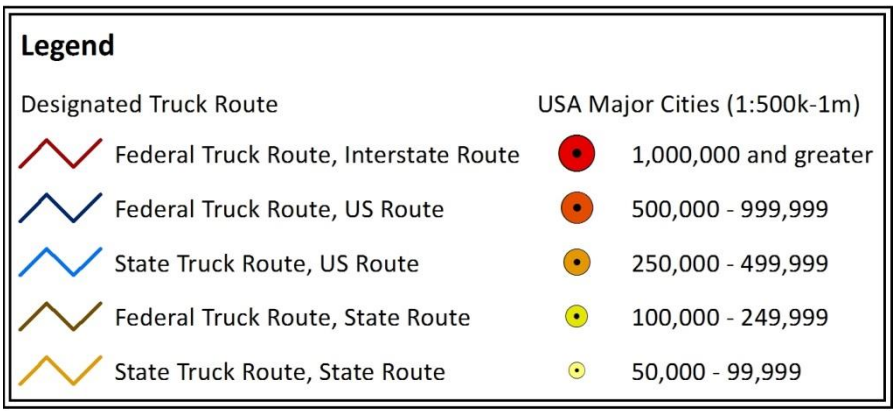
In 1982 Congress passed the Surface Transportation Assistance Act (STAA), which imposed a federal 80,000 pound limit across the entire Interstate Highway Network. It also required states to allow these vehicles "reasonable access" to the National Network (or National Truck Network). The National Network includes Interstate highways and additional "Federal-Aid Primary" (FAP) roads that could safely accommodate STAA vehicles. The Missouri roadways which are designated on the National Truck Network are depicted in **Figure A-4**.[3]

Figure A-3: Missouri Major Highways



[3] www.fhwa.dot.gov

Figure A-4: Missouri Truck Route System



Data Sources: MoDOT and ESRI

Rail

The rail industry classifies the freight rail network into three distinct operating categories: Class I, II, and III. The Missouri Freight Plan will utilize these classifications as the basis to define the rail assets within Missouri.

Railroad Classification

Railroad classification is determined by the U.S. Surface Transportation Board (STB) based on annual revenue dollars. In 2012 dollars, a railroad with operating revenues greater than $433.2 million[4] for at least three consecutive years is considered a Class I railroad. Similarly, a railroad with revenues greater than $34.7 million[5], but less than $433.2 million[6], is considered a Class II railroad; such railroads are commonly referred to as "regional" railroads.

A railroad not within the Class I or II categories is considered a Class III railroad, also known as a "short line". As the name indicates, short lines operate over a relatively short distance. Short lines serve the larger railroads by collecting and distributing railcars to individual industrial and agricultural shippers and receivers. They provide a critical service, particularly in lower-density rail corridors and markets where the larger railroads cannot operate cost-effectively. From a historical standpoint, many of the nation's short lines operate on branches previously owned and operated by the Class I railroads.

In addition, Missouri has eight switching and terminal railroads that move traffic between railroads, pickup/deliver rail cars at ports or industrial areas. These railroads provide connecting services to get freight to and from its ultimate origin or destination.

The following is a brief discussion of the freight railroads operating in Missouri as reported by the Association of American Railroads (AAR) as of June 2013.

Class I Railroads

Missouri has a significant freight rail infrastructure with six Class I freight railroads currently operating 4,218 miles of rail line within the State. **Table A-6** depicts the locations of the railroads within Missouri. **Figure A-5** shows railroad ownership in Missouri.

Table A-6: Miles of Class I Railroads in Missouri

Class I Railroads in Missouri	
	Miles Operated in Missouri
BNSF Railway Company	1,759
CSX Transportation	13
Kansas City Southern Railway Co.	396
Norfolk Southern Corporation	409
Soo Line Railroad Co. (Canadian Pacific)	144
Union Pacific Railroad Co.	1,497

[4] http://www.aslrra.org/about_aslrra/faqs/
[5] http://www.aslrra.org/about_aslrra/faqs/
[6] http://www.aslrra.org/about_aslrra/faqs/

Total Miles Operated by Class 1 Railroads	4,218

Source: Missouri State Rail Plan, MoDOT, 2012

Burlington Northern Santa Fe Railway Company (BNSF)

BNSF Railway operates one of North America's largest railroad networks, serving the western two-thirds of the U.S. It employs more than 40,000 people and operates on 32,000 route miles stretching across 28 States and two Canadian provinces.

- Headquarters: Fort Worth, TX
- Total System Mileage: 32,000 (28 States and Canada)
- Commodities Hauled: Waste or scrap materials; farm products; chemicals or allied products; waste hazardous materials or waste hazardous substances; coal, lumber or wood products (excluding furniture); transportation equipment; petroleum or coal products; non-metallic minerals; primary metal products.

BNSF operates the most rail infrastructure in Missouri with major rail junctions in Kansas City, Bucklin, Monroe City, St. Louis, Cape Girardeau, Springfield, and Carthage.

CSX Transportation (CSX)

CSX Corporation and its rail and intermodal businesses provide traditional rail service and the transport of intermodal containers and trailers. Its network encompasses about 21,000 route miles of track in 23 States, the District of Columbia and the Canadian provinces of Ontario and Quebec. It serves all Atlantic and Gulf Coast ports, as well as the Mississippi River, the Great Lakes, the St. Lawrence Seaway and (through western railroad alliances) U.S. Pacific ports.[7] The CSX transportation network serves some of the largest population centers in the nation. More than two-thirds of Americans live within CSX's service territory. The western terminus of the CSX network is in East St. Louis, Illinois. While CSX does not own any Missouri trackage, according to their 2010 R-1 Report[8] to the STB the company operates on 13 miles in the State via trackage rights, secured through part ownership of the St. Louis Terminal Railroad Association (TRRA).

- Headquarters: Jacksonville, FL
- Total System Mileage: 21,000 (23 States, DC and Canada)
- Commodities Hauled: Freight of all kinds; electrical machinery; equipment, or supplies; waste or scrap materials; chemicals or allied products; waste hazardous materials or waste hazardous substances; food or kindred products

CSX Transportation serves the St. Louis metropolitan area providing rail connections to the east coast.

Kansas City Southern Railway Co. (KCS)

The Kansas City Southern (KCS) is a transportation holding company headquartered in Kansas City. Its North American holdings include the Kansas City Southern Railway Company (serving the central and

[7] http://www.csx.com/index.cfm/about-csx/company-overview/

[8] Class I Railroad Annual Report to the Surface Transportation Board for the Year Ending December 31, 2010. CSX Transportation, Inc.

south-central U.S.); Kansas City Southern de Mexico (serving northeastern and central Mexico and the port cities of Lázaro Cárdenas, Tampico and Veracruz); and a 50 percent interest in Panama Canal Railway Company (providing ocean-to-ocean freight and passenger service along the Panama Canal).[9] KCS' North American rail holding and strategic alliances are primary components of a North American Free Trade Agreement (NAFTA) railway system, linking the commercial and industrial centers of the U.S., Mexico and Canada.[10] According to its 2010 STB R-1 report, KCS owns 396 miles of track in Missouri and does not have any additional operational miles through trackage rights.[11]

- Headquarters: Kansas City, MO
- Total System Mileage: 3,100 (10 States)
- Missouri Connecting Cities: Kansas City, Joplin
- Commodities Hauled: Farm products; lumber or wood products (excluding furniture); primary metal products; food or kindred products

KCS provides rail service to the north central and western regions of the State running through its corporate headquarters in Kansas City.

Norfolk Southern Corporation (NS)

Norfolk Southern Corporation (NS), through its Norfolk Southern Railway subsidiary, operates approximately 20,000 route miles in 22 States and the District of Columbia. NS serves every major container port in the eastern U.S. and operates the most extensive intermodal network in the East.[12] It is a major transporter of coal and industrial products and has major rail classification yards and intermodal terminals in Kansas City and St. Louis.

- Headquarters: Norfolk, VA
- Total System Mileage: 20,000 (22 States and DC)
- Major Local Facilities: Intermodal facilities located in Kansas City (Voltz Yard and Triple Crown Services Yard) and St. Louis (Luther Yard) and maintenance facilities in Kansas City, St. Louis, and Moberly
- Commodities Hauled: Agriculture; consumer and government; metals; construction; paper, clay and forest; chemicals; automotive; intermodal; coal; coke and iron ore

Norfolk Southern Corporation provides rail service through the north central region of the State, with major rail junctions in St. Louis, Monroe City, and Kansas City.

Soo Line Railroad Co. (CP)

The Canadian Pacific Railway (CP) operates on 14,800 miles of track in six Canadian provinces and 13 U.S. States. Kansas City is the southernmost point of the CP network. The Soo Line Railroad Co. is a Class 1 U.S. railroad, which is wholly owned by CP and does rail business under the CP name. The CP

[9] http://www.kcsouthern.com/en-us/AboutKCS/Pages/AboutKCSMain.aspx
[10] http://www.kcsouthern.com/en-us/AboutKCS/Pages/AboutKCSMain.aspx
[11] Class I Railroad Annual Report to the Surface Transportation Board for the Year Ending December 31, 2010. Kansas City Southern Railway Company.
[12] http://www.nscorp.com/nscportal/nscorp/Media/Corporate%20Profile/

also operates the Dakota, Minnesota & Eastern Railroad Corporation (DM&E) and the Iowa, Chicago & Eastern (IC&E) Railroad.

IC&E territory covers 1,400 miles of track in Illinois, Iowa, Minnesota, Missouri, and Wisconsin. Its main lines extend from Chicago to Kansas City, and from Sabula, Iowa, along the Mississippi River northwesterly to the Minneapolis-St. Paul area, using trackage rights over the CP from La Crescent, Minnesota. Branch lines (known as the "Corn Lines") extend through Iowa from Marquette west to Mason City and Sheldon, and through Minnesota from Austin to Jackson and Rosemount.

- U.S. Headquarters: Minneapolis, MN
- Total System Mileage: 6,100 (18 States and provinces)
- Missouri Connecting Cities: Chillicothe
- Major Local Facilities: Kansas City, MO yard
- Commodities Hauled: Grains; automobiles; lumber; steel; chemicals

Missouri originated and destined cars handled in excess of 30,000 loads in 2011

The Canadian Pacific serves the Kansas City area providing rail connections to north central U.S. and Canada.

Union Pacific Railroad Co. (UP)

Union Pacific Railroad (UP) is an operating subsidiary of Union Pacific Corporation. Its operation covers 23 States in the western two-thirds of the U.S. The railroad links every major West Coast and Gulf Coast port and provides service to the east through its four major gateways in Chicago, St. Louis, Memphis and New Orleans. Additionally, Union Pacific operates key north/south corridors, serving all six major gateways to Mexico and interchanging traffic with the Canadian rail systems.

The rail system serves the country's fastest growing cities and states. UP serves the western coal reserves, Gulf Coast chemical industry and the rock quarries of south Texas. The railroad is the nation's largest hauler of chemicals and one of the largest intermodal carriers of truck trailers and marine containers. The railroad helps link production and consumption points in the U.S. and across the world, delivering energy, food, raw materials, durable and consumer goods to support the nation's growth.

The railroad has a diversified commodity mix, including chemicals, coal, food and food products, forest products, grain and grain products, intermodal, metals and minerals, and automobiles and parts. The largest of Union Pacific's 25,000 customers include steamship lines, vehicle manufacturers, agricultural companies, utilities, intermodal companies, and chemical manufacturers.

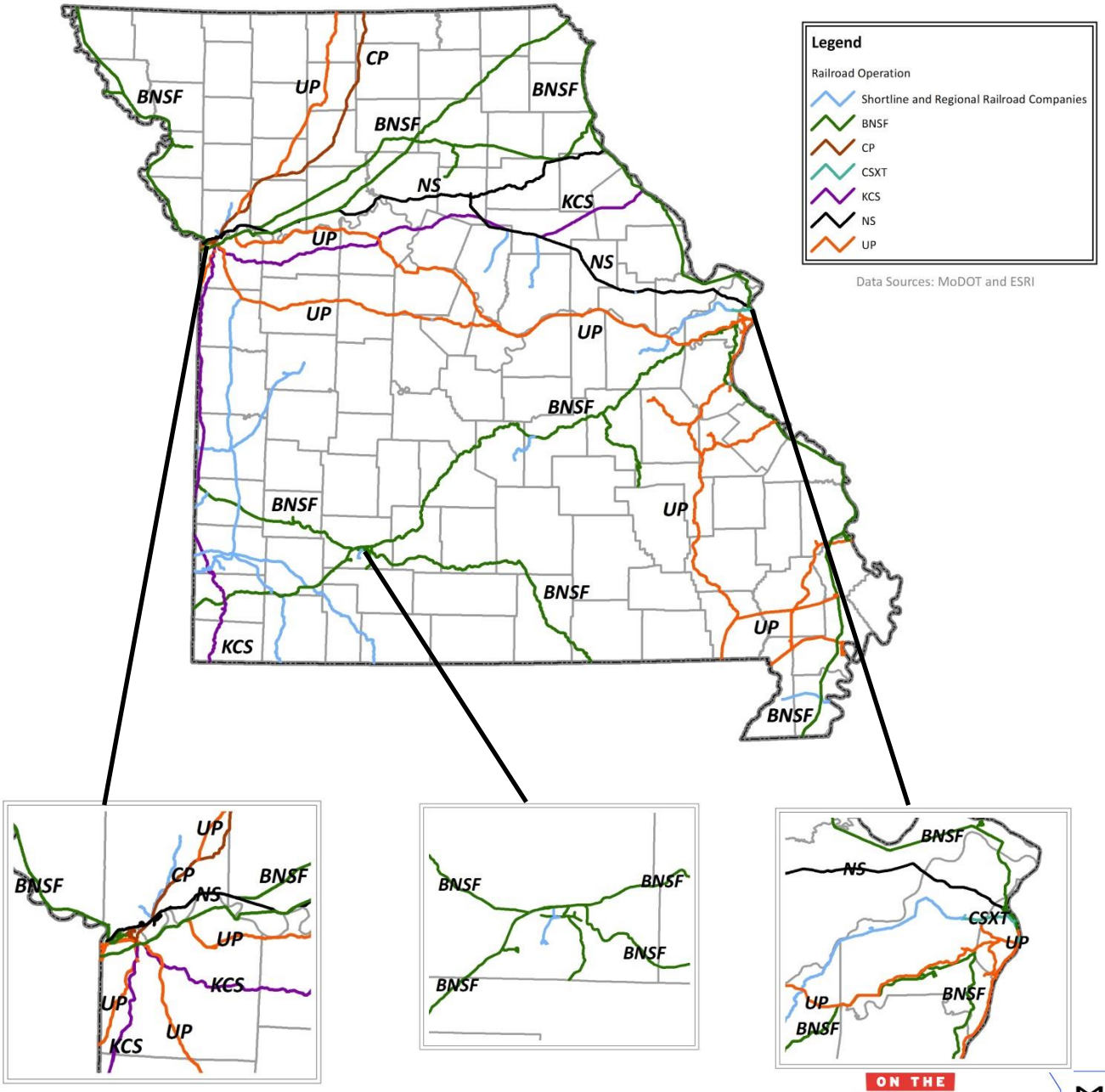
About 85 Union Pacific trains pass through Missouri daily. The UP facility in DeSoto, 40 miles south of St. Louis, is one of UP's three major freight car repair facilities. Kansas City is the site of a major UP freight classification yard, and the company operates terminals in St. Louis, Sedalia, Jefferson City, and Poplar Bluff. The UP also connects with four Missouri short line railroads: the Arkansas and Missouri, the Central Midland, the Missouri and Northern Arkansas, and the Semo Port. In 2010, UP handled more than 110,000 carloads originating from these short lines.

- Headquarters: Omaha, NE

- Total System Mileage: 32,000 (23 States in the western two-thirds of the U.S.)
- Missouri Connecting Cities: Kansas City, Columbia, Jefferson City, St. Louis, and Cape Girardeau
- Major Local Facilities: Kansas City and St. Louis
- Commodities Hauled: Chemicals; coal; food and food products; grain and grain products; intermodal metals and minerals; automobiles and parts

Union Pacific Railroad serves the metropolitan areas of Kansas City, Jefferson City, St. Louis, Cape Girardeau, and Poplar Bluff.

Figure A-5: Railroad Ownership within Missouri



Class II Railroads in Missouri

There are no Class II railroads operating in Missouri.

Short Lines (Class III Rail) in Missouri

Short line railroads connect Class I Railroads and commodity shippers and receivers. They often operate where it is not financially feasible for Class I Railroads to provide service. A total of five short line railroads, listed in **Error! Reference source not found.,** serve Missouri. These systems include a total of 450 track miles, 426 within Missouri, ranging from 33 to 331 track miles per operator.

Table A-7: Miles of Short Line Railroads in Missouri

Short Line Railroads in Missouri	
	Miles Operated in Missouri
Arkansas & Missouri Railroad (AMR)	33
Kaw River Railroad (KRR)	21
Missouri & Northern Arkansas Railroad (MNA)	331
Ozark Valley Railroad, Inc. (OVR)	33
South Kansas & Oklahoma Railroad (SKO)	8
Total mile operated by Local / Short Line Railroads	426

Source: Missouri State Rail Plan, MoDOT, 2012

Switching and Terminal Railroads in Missouri

Switching and Terminal Railroads are Class III railroads engaged primarily in providing these services for other railroads (i.e., they are not typically involved in line-haul moves between two geographical locations). They are often categorized with short line railroads due to their operational and revenue characteristics, except in cases where they are owned by one or more Class I carriers. **Table A-8** lists the Switching and Terminal Railroads in Missouri.

Table A-8: Miles of Switching and Terminal Railroads in Missouri

Switching and Terminal Railroads in Missouri	
	Miles Operated in Missouri
Central Midland Railway	52
Columbia Terminal	22
Kansas City Terminal Railway Co.	32
Manufacturers Railway Co.	7
Missouri & Valley Park Railroad Corp.	27
Missouri North Central Railroad	4
SEMO Port Railroad, Inc.	8
Terminal Railroad Assn. of St. Louis	26
Total Miles Operated by Switching & Terminal Railroads	178

Source: Missouri State Rail Plan, MoDOT, 2012

Central Midland Railway

Central Midland Railway (CMR) operates 42 miles of the former Rock Island line between Vigus and Union, Missouri. CMR interchanges with the TRRA at Lackland. CMR is contracted by Ameren Corporation to operate the line owned by Missouri Central. The remaining 213 miles of the Rock Island Line between Union and Pleasant Hill is out of service, but is not formally abandoned.[13]

Columbia Terminal Railroad

The Columbia Terminal Railroad (COLT) is a full-service short line rail, trucking, and storage network serving mid-Missouri. It is owned and operated by the City of Columbia, Missouri.

The COLT railroad operates on 22 miles of track running between Columbia and Centralia where the railroad interconnects with Norfolk Southern. Shippers located in the COLT area work directly with Norfolk Southern for car supply, tariffs, billing, collections and general marketing. COLT handles more than 1,500 cars annually and carries aggregates, automotive parts, chemicals, coal, forest products and scrap metals. The line is rated FRA Class II, which allows train speeds of 25mph.[14]

Kansas City Terminal Railway Company

The Kansas City Terminal Railway (KCT) is a joint operation of the trunk railroads in the Kansas City metropolitan area, the country's second-largest rail hub. It is the nation's largest terminal railway by gross ton and is presently operated by the Kaw River Railroad.

The railway owns and dispatches 100 miles of track (34 in Kansas and 66 in Missouri) and leases six locomotives. It serves the Class I railroads: BNSF, Kansas City Southern, Norfolk Southern Railway, Union Pacific and Canadian Pacific/Soo (formerly DM&E) and Class III railroads: Missouri and Northern Arkansas Railroad; and Amtrak.

Manufacturers Railway Co.

The Manufacturers Railway Company (MRS) located in St. Louis is owned by the Anheuser-Busch brewing company. Its 3.6-mile line connects with the TRRA in St. Louis. Through trackage rights over the company's line on the MacArthur Bridge, MRS connects with the Alton and Southern Railroad in East St. Louis, Illinois. In March 2011, Anheuser-Busch applied to the Surface Transportation Board to discontinue all service on the MRS after the brewery began shipping outbound products via truck instead of rail. However, Anheuser-Bush later announced it would transfer all rail switching services to Foster Townsend Rail Logistics, Inc. (FTRL Railway) to support St. Louis brewery operations after Manufacturers Railway ceases operation.[15]

Missouri & Valley Park Railroad Corp.

Effective January 30, 2011, Burlington Junction Railway began operations in Fenton on the Valley Park line. The railroad serves online customers and a transload site in Fenton. The MVP interchanges with

[13] http://www.progressiverail.com/where_we_go.html
[14] www.gocolumbiamo.com/WaterandLight/About_Us/COLT/
[15] http://www.ftrail.com/

BNSF and has the capacity to handle loads up to 286,000 pounds. Its transload facility is near I-44 and I-270 and has an outdoor yard ramp for machinery and equipment loading/unloading. The facility can handle bulk transfer, including food grade, and offers warehousing and boxcar unloading and loading.

Missouri North Central Railroad

The Missouri North Central Railroad (MNC) serves an industrial park in Chillicothe through a lease with the City. Operations began in 2004 over 37 miles of track from Brunswick to Chillicothe in Northwest Missouri. The line from Sumner to Brunswick was subsequently abandoned. The line interchanges with the CP/Soo line (formerly the IC&E/DM&E) in Chillicothe and with the BNSF in Brunswick.

Semo Port Railroad, Inc.

The Semo Port Railroad (SE) provides local switch service to the port facilities in Scott City and provides interchange connections with both the UP and BNSF. It does so by a six-mile Union Pacific branch line purchased in 1994 by the Semo Port. A one-mile extension to Semo Port's harbor industrial area was completed in 1995.

Motive Rail Corporation is the rail freight service contractor, providing transportation and other services to SE under contract. Commodities hauled by the Semo Port Railroad include aggregates, chemicals, food and feed products, and steel and scrap metal. At Cape Girardeau, Semo Port Railroad connects with BNSF's main line between St. Louis and Memphis. Through St. Louis, the BNSF has routes to Chicago, St. Paul, Kansas City, Denver, and Seattle. Through Memphis, BNSF routes serve Birmingham, New Orleans, Houston, Dallas, California, and Mexico.

The SE's six-mile mainline is heavy welded rail (115 pounds and 133 pounds in curves). As a former UP branch, it handled heavy 100-car unit coal trains between southern Illinois and Missouri until 1990. The Harbor Lead track is 115 pound jointed rail. SE can handle 286,000- pound cars. Clearances allow movement of shipments handled on the main lines, including double-stack container cars.

At Capedeau Junction (east of Scott City), the Semo Port Railroad connects with UP's main line just west of the UP's double-track bridge over the Mississippi River.

Terminal Railroad Association of St. Louis

TRRA owns and operates the Merchants Bridge, the MacArthur Bridge, a rail switching facility in Madison, Illinois, and several key railroad routes in St. Louis, Missouri, and Madison and St. Clair Counties in Illinois.

The Merchants Bridge is a half-mile-long railroad-only bridge over the Mississippi River located just north of the downtown St. Louis area. Still a vital link in the company's operations, the Merchants Bridge was completed on March 18, 1890.

The MacArthur Bridge is part of a 6.2-mile-long elevated track crossing the Mississippi River in the heart of downtown St. Louis. The MacArthur Bridge and elevated track is the second-longest elevated steel structure across the Mississippi River. The MacArthur Bridge was originally constructed with a road deck over the rail deck; the bridge is currently used for railroad traffic only.

The company's rail switching yard in Madison, Illinois, is the largest such facility in the region. Approximately 30,000 cars pass through the company's switching facility on a monthly basis and are redirected to other destinations. The switching yard consists of 80 tracks (inbound, outbound and holding) with a capacity of 2,200 cars at any one time. The company operates 30 locomotives to move cars around the yard, deliver cars to local industries, and ready trains for departure.

Railroad Connectivity

Railroads provide important connections to water ports and intermodal terminals. Missouri is uniquely positioned with the Mississippi and Missouri Rivers providing rail access to ship and barge traffic. **Table A-9** lists the major Missouri water ports that have direct rail access and their connecting railroads. **Table A-10** lists the NHS Intermodal Connectors that connect to truck/rail intermodal facilities.

Table A-9: Major Missouri Water Ports with Direct Rail Access and their Connecting Railroads

Missouri Ports with Connecting Railroads

Port	Location	Connecting Railroads
Pemiscot County Port Authority	Mississippi River between Hayti and Caruthersville	BNSF
SEMO Port, Southeast Missouri Regional Port Authority	Mississippi River at Scott City	UP and BNSF
New Madrid County Port Authority	Mississippi River 175 miles south of St. Louis	UP
St. Louis Municipal River Terminal	Mississippi River at St. Louis	BNSF, UP, NS and CSX
Kansas City Port Authority	Confluence of the Missouri and Kansas Rivers in Kansas City	UP

Source: Missouri State Rail Plan, MoDOT, 2012

Table A-10: NHS Intermodal Connectors to Truck/Rail Facilities

NHS Intermodal Connectors to Truck/Rail Facilities

Truck/Rail Facility	NHS Intermodal Connector Description
Burlington Northern, Kansas City	From I-29/35 (exit 6B): east 5.5 mi on Route 210 to facility entrance
Burlington Northern, Kansas City	From State Route 291: southwest 4.5 mi on Route 210 to facility entrance
Kansas City Southern, Kansas City	South on Chouteau Freeway from Route 210
Norfolk Southern/Triple Crown, Kansas City	From I-29/35 (exit 6B): east 5.5 mi on Route 210 to facility entrance
Norfolk Southern/Triple Crown, Kansas City	From State Route 291: southwest 4.5 mi on Route 210 to facility entrance
Norfolk Southern/Triple Crown, St. Louis	From, I-70 (exit 247); northeast 0.3 mi on Grand, northwest 1.5 on Hall to intermodal facility
Norfolk Southern/Triple Crown, St. Louis	From I-270 (exit 34); southwest 5.7 mi on Riverview Drive and continuing on Hall Street to terminal
Union Pacific, Kansas City	From Route 210 intermodal connector; south 2 mi on Chouteau Trafficway to facility entrance on Gardner Avenue

Source: FHWA

At-Grade Railroad Crossings

At-grade rail crossings present potential roadway safety and delay issues. There are over 5,600 at-grade railroad crossings within Missouri. **Table A-11** shows at-grade rail crossings by type, including freight railroad, Amtrak, and commuter rail operations. The intersection warning devices provided at those intersections are listed in **Table A-12**.

Table A-11: Highway-Rail Grade Crossings by Type 2011

Highway-Rail Grade Crossings by Type 2011

State	Total (number)	Public, motor vehicle (%)	Private, motor vehicle (%)	Pedestrian (%)
Missouri	5,697	60.3	38.9	0.8

Source: U.S. Department of Transportation, Federal Railroad Administration, Railroad Safety Statistics Preliminary Annual Report, table 9-2, available at safetydata.fra.dot.gov/OfficeofSafety/publicsite/Prelim.aspx as of April 2013.

Table A-12: Warning Devices at Public Highway-Rail Grade Crossings

Warning Devices at Public Highway-Rail Grade Crossings

		Percent of Total							
State	Total (number)	Cross bucks* (%) **white x-like signs that indicate railroad crossing*	State (%)	Flashing lights (%)	Stop signs (%)	Unknown (%)	Special warning (%)	Highway Traffic Signals, Wigways, bells (%)	Other (%)
Missouri	3,436	46.1	26.5	19	3.3	2.7	1.4	1	0.1

Source: USDOT, Bureau of Transportation Statistics 2012

Water

Moving $12.5 billion in cargo in 2012, Missouri waterways provide low-cost transportation benefits to businesses from around the globe. The Missouri and Mississippi Rivers are part of a large inland waterway network connecting 21 States with access through the Gulf of Mexico and the Great Lakes to the international maritime markets.

A previous collection of studies has been reviewed along with more recent data from TRANSEARCH on freight movements. Previous studies include: *Missouri Public Port Authorities: Assessment of Importance and Needs (2006)*, *Update of Missouri Public Port Authority Assessment (2007)*, *Freight Optimization and Development in Missouri: Ports and Waterways Module (2008),* and the *Missouri River Freight Corridor Assessment and Development Plan (2011)*.

Missouri Waterways

Missouri sits in the heart of the Mississippi River Valley, with the Missouri and Illinois Rivers converging near St. Louis and the Ohio River converging at Cairo, Illinois, just across the Missouri stateline. Missouri contains approximately 1,050 miles of navigable rivers, including 500 miles of the Mississippi River, and 550 miles of the Missouri River. The Mississippi River is divided into the Upper Mississippi (860 miles) limited by a series of locks and dams and the Lower Mississippi (1,480 miles) with uninterrupted flow south to the Gulf of Mexico.

Public Ports

Appendix A: Assets and Freight Flow Technical Memo

A total of 14 public port authorities and over 200 private ports can be found along Missouri's waterways. Three public port authorities and over 50 private ports operate along the Missouri River; 11 public port authorities and over 150 private ports operate on the Mississippi River. The 14 public port authorities occupy roughly 2,000 acres of land and currently report service to 36 counties and six other states.[16]

A Port Authority is the organizational and decision-making body that guides the development of public ports as established by the Missouri General Assembly. A Port Authority encourages economic development and job creation, approves any construction that may take place at the public port, prevents or removes obstructions in harbor areas, acquires right-of-way within port districts, and disburses funds for activities, among other duties. There are different categories of public port authorities: active, inactive, and developing ports. There are six active public ports which have shipped product within the last year. There are three inactive public ports which have a public port facility but did not ship product within the last year. There are five developing public ports which currently do not have a public port facility. **Table A-13** lists the public port authorities and **Figure A-6** shows their locations.

Table A-13: Public Port Authorities status, location, and transportation access.

Public Port Authorities

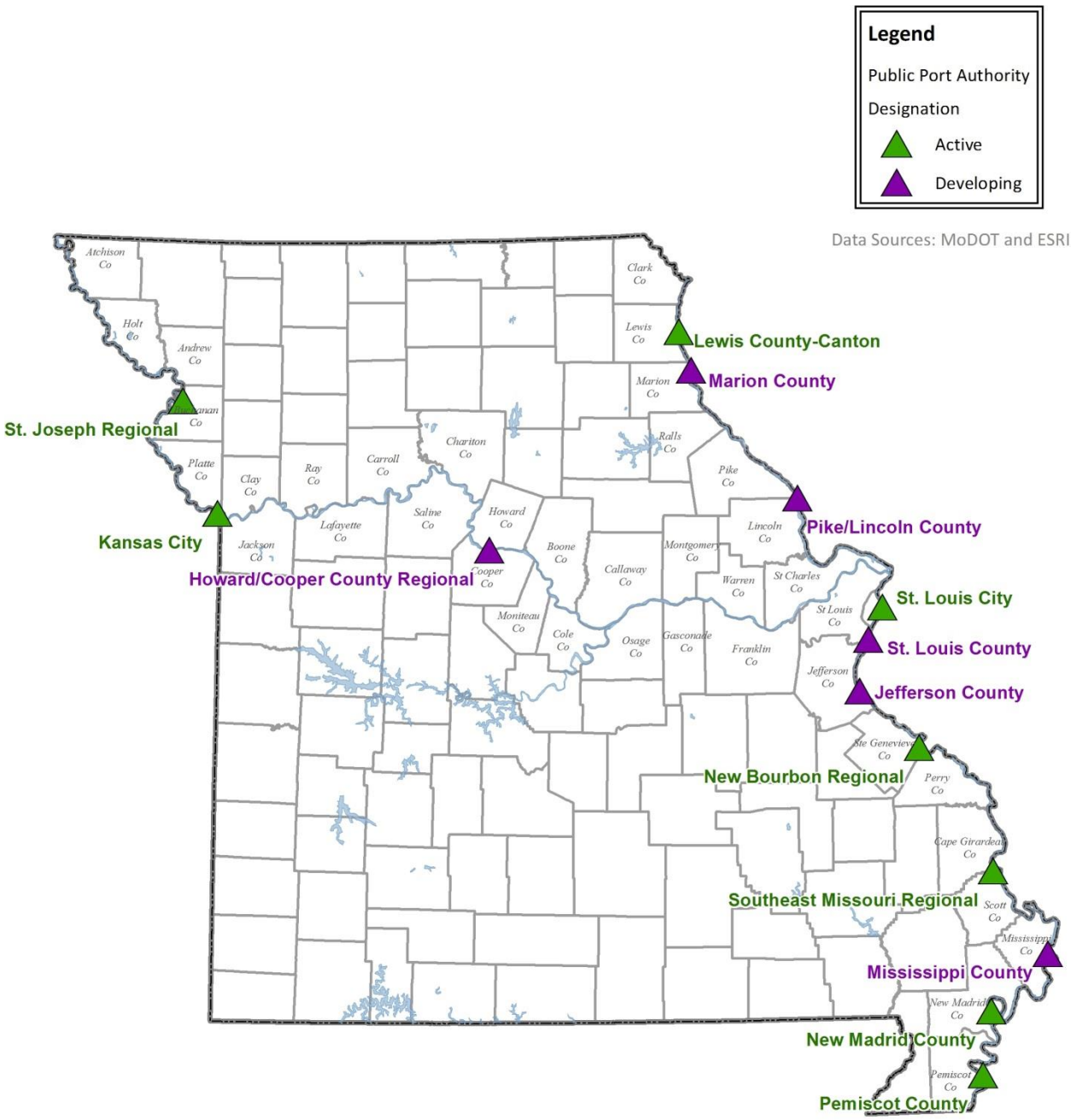
Port	Status	Location	Transportation Access
City of St. Louis Port Authority	Active	Mississippi River (mile 171.9 to 191.2)	Road: I-70, I-64, I-55, I-44; Rail: six Class I railroads; Air: two international airports; Pipeline: two major transcontinental
Howard/Cooper County Regional Port Authority	Inactive	Missouri River (mile 196.5)	Road: I-70, US-40 & 87, & MO-5; Rail: Union Pacific Railroad
Jefferson County Port Authority	Developing	Mississippi River (specific location to be determined)	Road: I-55 and US-61/67; Rail: Union Pacific & BNSF Railroads
Kansas City Port Authority	Inactive	Missouri River (mile 367.1)	Road: I-70, I-35, I-29 and US-71 (I-49); Rail: Union Pacific Railroad; Air: KCI & KC Municipal Airports
Lewis County-Canton Port Authority	Active	Mississippi River (Pool 21)	Road: US- 61; Rail: BNSF Railroad
Marion County Port Authority	Developing	Mississippi River (specific location to be determined)	Road: I-72, US-24, US-36, US- 61 Rail: BNSF Railroad, Norfolk Southern
Mississippi County	Developing	Confluence of the	Road: US-60

[16] Missouri Public Port Authorities: Assessment of Importance and Needs, 2006.

Port Authority		Ohio and Mississippi Rivers (specific location to be determined)	
New Bourbon Regional Port Authority	Active	Mississippi River - Upper River mile 120.5	Road: US-61 & I-55; Rail: BNSF Railroad
New Madrid County Port Authority	Active	Mississippi River (885)	Road: I-55 Rail: Union Pacific Railroad
Pemiscot County Port Authority	Active	Mississippi River (849.9)	Road: I-55, I-155/US-412; Rail: BNSF Railroad
Pike/Lincoln County Port Authority	Developing	Mississippi River (specific location to be determined)	Road: US-61, 54 & MO-79; Rail: KC Southern and BNSF Railroad
SE Missouri Regional Port Authority	Active	Mississippi River (Upper River mile 48)	Road: I-55, I-57, I-24, I-64 & US-60; Rail: Union Pacific and BNSF Railroads
St. Joseph Regional Port Authority	Inactive	Missouri River (448)	Road: I-29, I-229 & US-36; Rail: Union Pacific and BNSF Railroads Air: St. Joseph Rosecrans Memorial Airport
St. Louis County Port Authority	Developing	Mississippi River (specific location to be determined)	Road: I-70, I-64, I-55, I-44; Rail: six Class I railroads; Air: two international airports; Pipeline: two major transcontinental

Source: http://www.missouriports.org/index.html

Figure A-6: Public Port Authorities



Active Public Ports

City of St. Louis Port Authority, Mississippi River

Figure A-7: City of St. Louis Port Authority

Source: http://www.missouriports.org/citystlouis.html

The City of St. Louis Port Authority **(Figure A-7)** has easy access to the Illinois River and the Missouri River as it sits at the intersection of U.S. Department of Transportation Marine Highways, M70 and M55. This is the second largest inland port by trip-ton miles, and third largest by tonnage.[17] There are over 130 piers, wharves, docks, fleeting, and other facilities with 16 public terminals. Twenty-nine industrial centers with a population of 90 million can be reached from St. Louis by barge. Industrial development sites are available in the City's 3000-acre North Riverfront Business Corridor.

Lewis County – Canton Port Authority

Figure A-8: New Madrid County Port Authority

Source: http://www.missouriports.org/madrid.html

The Lewis County – Canton Port facility handles barge operations supporting grain, liquid fertilizer and dry bulk commodities.

New Bourbon Regional Port Authority

The Port of New Bourbon has barge access to Chicago, Memphis, Gulf Ports and ocean shipping services. There is transfer capability for inbound/outbound general cargo, aggregates and bulk commodities. The port can accommodate truck-to-barge/barge-to-truck transfers. There are building and storage sites available.

New Madrid County Port Authority

The Port of New Madrid County **(Figure A-8)** is located within the 4,200-acre St. Jude Industrial Park. This area is a designated Enterprise Zone. The facility is accessible by barge, truck and rail. Acreage is available for development within the industrial park.

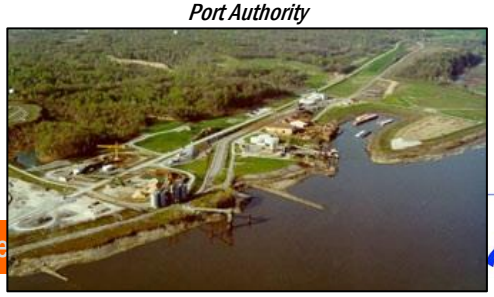
Figure A-9: Pemiscot County Port Authority

Source: http://www.missouriports.org/pemiscot.html

Pemiscot County Port Authority

The Pemiscot County Port **(Figure A-9)** has transportation links to all surrounding cities, including St. Louis and Memphis. Forty-three percent of the total U.S. population and 42% of the total U.S. manufacturing establishments are within a two-day drive. There are 30 acres of port-owned building sites available. This area is a designated Enterprise Zone. Enhanced Enterprise Zones are specified

Figure A-10 Southeast Missouri (SEMO) Regional Port Authority



Source: http://www.missouriports.org/southeast.html

[17] http://www.missouriports.org/citystlouis.html

geographic areas designated by local governments and certified by the Department of Economic Development. Zone designation is based on certain demographic criteria, the potential to create sustainable jobs in a targeted industry, and a demonstrated impact on local industry cluster development.

Southeast Missouri (SEMO) Regional Port Authority

The SEMO Port **(Figure A-10)** handles general cargo, dry bulk commodities and project cargo. The port provides barge access to Gulf ports and worldwide open shipping services. Same day truck service is available to St. Louis, Nashville, Memphis, and Kansas City with next day truck service to Chicago, Atlanta, and Dallas. There is land available for development with existing leases on additional acreage.

Inactive Public Ports

Figure A-11: Howard/Cooper County Regional Port Authority

Source: Missouri Public Port Authorities: Assessment of Importance and Needs

Howard/Cooper County Regional Port Authority

The Howard/Cooper County Regional Port Authority **(Figure A-11)** is the only public shipping access between Kansas City and St. Louis. There are no locks or dams obstructing the channel of the Missouri River from this site to its junction with the Mississippi River in St. Louis. There is capacity for grain, liquid chemicals, and dry storage. Thirty-five prime industrial acres are available for development. Currently this Port is considered inactive.

Kansas City Port Authority

The Kansas City Port Authority is one of the largest storage and distribution centers serving the Missouri River. This is a true intermodal facility, transferring product between barge, rail, and truck. The terminal effectively serves any area within a 200-mile radius of Kansas City, Missouri. There are 145 acres available for industrial or retail development. This Port is currently categorized as inactive.

Figure A-12: St. Joseph Regional Port Authority

Source: http://www.missouriports.org/stjoseph.html

St. Joseph Regional Port Authority

The St. Joseph Regional Port Authority **(Figure A-12)** is located 50 minutes from downtown Kansas City, MO, and two hours from Omaha, NE. This location is within 500 miles of 43 percent of the U.S. Population and 44 percent of the U.S. manufacturing establishments. There is potential for industrial development with 31 acres in redeveloped Stockyards Industrial Park, minutes south of the park on MO-759. The Port is currently considered inactive.

Developing Public Port Authorities

Jefferson County Port Authority

Jefferson County does not currently have a port facility. The objective of the port authority has been to buy land and develop a port in the near future. The location of Jefferson County is prime for waterway development due to the long Mississippi River border and intermodal access near the river. The port site is undeveloped today and lacks adequate highway infrastructure suitable for a port or any commercial development.

Figure A-13: Mississippi County Port Authority

Source: http://www.missouriports.org/mississippi.html

Marion County Port Authority

Marion County Port Authority plans have included building a port to support development of an ethanol

plant on site, adding a biofuel plant and developing new intermodal capabilities for Container-on-Vessel (COV).

Mississippi County Port Authority

The location of the Mississippi County Port **(Figure A-13)** allows year-round access for barge operators as the northern-most ice-free area on the Mississippi. Vehicle ferry service operates seven days a week on a continuous basis from Dorena, Missouri to Hickman, Kentucky. The port authority is situated on 18 acres with nearly 1,900 feet of river frontage. Currently Mississippi County Port falls into the developing category.

Pike/Lincoln County Port Authority

The Pike and Lincoln County port is a developing port with barge service provided via the Mississippi River. Many existing businesses already take advantage of this form of transportation to distribute their products and bring in raw materials. There is currently no port at this location.

St. Louis County Port Authority

Efforts to bring commercial uses to the St. Louis County Port Authority site have not succeeded due to extensive remediation, lack of flood protection, and limited access to other transportation modes. Some work has been done to improve access issues. The port is considered developing at his time.

Private Ports

There are over 200 private ports in Missouri that include marinas and docks that directly connect businesses to waterways. While these are obviously important to Missouri, they do not receive funding from MoDOT's multimodal section, and were considered beyond the scope of this study.

Locks & Dams

The lock and dam system, under the jurisdiction of the U.S. Army Corps of Engineers, was implemented to control the river levels and provide more reliable navigation. The seven locks and dams adjacent to Missouri, listed in **Table A-14**, are part of the Upper Mississippi River starting just north of St. Louis to the Iowa border. The Lower Mississippi River (south of St. Louis) and the Missouri River contain no locks or dams.

Table A-14: Listing and Location of Locks and Dams Adjacent to Missouri

Missouri's Locks and Dams	
Lock/Dam Number	**Location**
No. 20	Canton, MO
No. 21	Quincy, IL
No. 22	Saverton, MO

No. 24	Clarksville, MO
No. 25	Winfield, MO
No. 26 (Melvin Price)	East Alton, IL
No. 27 (Chain of Rocks Dam)	Glasgow Village, MO
No. 27 (Chain of Rocks Lock)	Granite City, IL

Source: U.S.. Army Corps of Engineers

Maritime Highways

Since 2009, the U.S. Department of Transportation has designated several marine highways for transporting cargo on water, reducing pollution and congestion on roads. Designated marine highways receive preferential treatment for federal assistance from the U.S. Maritime Administration (MARAD). Maritime highways serving Missouri include M-29 covering the Upper Missouri River from Kansas City to Sioux City, Iowa; M-70 covering the Missouri River from Kansas City to St. Louis; M-35 from St. Louis to the Twin Cities, and M-55 covering the Mississippi River from St. Louis to the Gulf of Mexico and from St. Louis to Chicago.

Air

The Federal Aviation Administration (FAA) categorizes public use airports into the following categories: Primary Commercial Service Airports, Non-primary Commercial Service Airports, Reliever Airports, and General Aviation Airports. Primary Commercial Service Airports are further broken down into subcategories of Large Hub, Medium Hub, Small Hub, and Non-hub depending on their percentage of total U.S. passenger enplanements. Commercial Service Airports are those with at least 2,500 annual passenger enplanements and regularly scheduled commercial airline traffic.[18]

The quantity of air cargo moving between origin and destination points, and also the amount of cargo transferring via an airport, is closely related to airport infrastructure capacity. Missouri's busiest cargo airports are located near major metropolitan areas that produce consistent passenger and air cargo traffic. Consequently, these facilities must be able to support large aircraft capable of accommodating market demand. The State's smaller airports, generally located near Missouri's medium-sized metro areas, generally have infrastructure capable of supporting smaller-scale air cargo operations. These airports can be used to move cargo traffic to larger airports and airports outside of the State.

The movement of air cargo takes place via one of three types of carriers: all-cargo, integrated express, or on passenger airlines as belly cargo. Integrated express operators rely on a hub-and-spoke system to move the customer's goods door-to-door, providing shipment, collection, transport via air/truck, and delivery. Integrated express operators include FedEx Express, UPS, and formerly DHL (domestic pickup and delivery service discontinued in January 2009). All-cargo carriers operate airport-to-airport freight services for their customers but do not offer passenger service. All-cargo carriers include China Cargo, Capital Cargo International, USA Jet Airlines, and Kalitta Charters, to name a few. Internationally, Aeromexico, Air Canada, Air Transport International, United Cargo and Volga-Dnepr Airlines are passenger airlines with their own fleet of dedicated freighter aircraft. All-cargo carriers offer scheduled

[18] http://www.faa.gov/airports/planning_capacity/passenger_allcargo_stats/categories/

service to major markets throughout the world using wide body and/or containerized cargo aircraft. Air cargo services, or "belly cargo," provided by passenger airlines vary in scope and size from airline to airline, based on differences in aircraft operating fleet. A regional airline with a fleet of turboprop and regional jets cannot accommodate bulky cargo. Airlines operating wide body aircraft have containerized lower decks and are capable of handling large shipments. These air cargo networks are supplemented in the air by regional/feeder airlines and on the ground by freight forwarders/road feeder service (RFS) trucking companies.

Air cargo is typically lightweight, time-sensitive, and high-value. Common examples of air freight include perishables (flowers, fish, produce), computers and peripherals, telecommunications equipment, vehicle parts, oil and gas drilling equipment, pharmaceuticals, clothing, medical supplies and equipment, beauty supplies, as well as many others. It is impossible to know exactly what items are shipped as this information is not published by carriers. An aircraft may have a wide-ranging mixture of any of the above items on board. Assumptions can be made based on the economies of the markets being served; however, any assumptions would be speculative. Missouri is home to three of the top 110 cargo airports in North America in terms of total tonnage in 2012 listed in **Table A-15** and shown in **Figure A-14**.

Table A-15: Missouri's Top Freight Airports Listing, Location, 2001 and 2013 Cargo Tonnage and Ranks

Missouri's Top Freight Airports

ID	Airport Name	Associated City	2001 Total Cargo Tonnage	2013 Total Cargo Tonnage	2001-2013 CAGR*	North American Rank 2013	Global Rank 2013
MCI	Kansas City International Airport	Kansas City	142,563	99,354	-2.96%	37th	152nd
STL	Lambert - St. Louis International Airport	St. Louis	122,184	64,557	-5.18%	56th	N/A
SGF	Springfield-Branson National Airport	Springfield	11,337	12,693	0.95%	106th	N/A

Source: Airport Council International - North America (ACI-NA)
**CAGR = Compound Annual Growth Rate*

These three airports handled nearly 177,000 tons of total air cargo in 2013, which represents a decrease of 3.7 percent annually since 2001. In this same time frame, Missouri's fastest growing airport by total tonnage was Springfield-Branson National (SGF) at 0.95 percent annually. Kansas City International and Lambert – St. Louis International both experienced losses in total air cargo from 2001-2013. These airports handling freight are discussed in this section.

Figure A-14: Missouri's Top Freight Airports

Connections between the cargo airports and the highway networks are integral to the movement of freight from these gateways. **Table A-16** identifies the Interstate Highways that are within 90 miles of these major air cargo airports in Missouri.

Table A-16: Interstates in Proximity (within 90 miles) to Cargo Airports.

Interstates in Proximity to Cargo Airports			
Interstates	**MCI**	**STL**	**SGH**
I-29	X		
I-35	X		
I-44		X	X
I-49	X		X
I-55		X	
I-64		X	
I-70	X	X	
I-170		X	
I-255		X	
I-270		X	
I-435	X		
I-470	X		
I-635	X		
I-670	X		

Source: CDM Smith

Kansas City International

Kansas City International (MCI) is the primary airport serving the Kansas City metropolitan area. Located approximately 15 miles north of downtown Kansas City, MCI has three runways ranging from 9,500 feet to 10,801 feet. It is the busiest airport in Missouri regarding annual air cargo tonnage and moves more air cargo each year than any air center in a six-state region. In 2013, 99,354 tons of freight and mail passed through MCI, which ranks 37th in the U.S./North America and 152nd globally.

Air carriers benefit from many of MCI's competitive advantages such as direct highway access, central North American location, 252,000 square feet of cargo warehouse space, 1.27 million square feet of apron area, and three runways. In addition, MCI has a U.S. Postal Service (USPS) facility with airside access, as well as an on-airport trucking terminal that provides another 30,000 square feet of warehouse.

FedEx has been MCI's largest cargo carrier (in annual volume) every year since 1995. The FedEx development was financed with $10.5 million of bonds issued by the Industrial Development Authority of Kansas City, Missouri. In 1997, FedEx completed an 85,000-square-foot regional hub building at MCI that is capable of handling 6,000 packages per hour. The facility is designed to accommodate two wide body and four narrow body aircraft in its current configuration.

MCI encompasses 10,200 acres of land with a large area designated for cargo facilities. All-cargo carriers at MCI include DB Schenker, DHL, FedEx, and UPS. These carriers represent flights from MCI, to markets throughout North America and Canada. KCI's concentrated landside cargo facilities are well-served for aviation and trucking resources, all accessible by Mexico City Avenue. Mexico City Avenue functions as a "designated cargo road", which has its own connection to I-29, thereby segregating the truck traffic from passenger traffic. Mexico City Avenue is classified as a four-lane

principal arterial with a standard capacity of up to 24,000 vehicles per day. According to traffic counts recorded in spring 2007 at Mexico City Avenue between Prairie View Road and Paris Street, there are approximately 8,200 vehicles traveling on Mexico City Avenue per day.

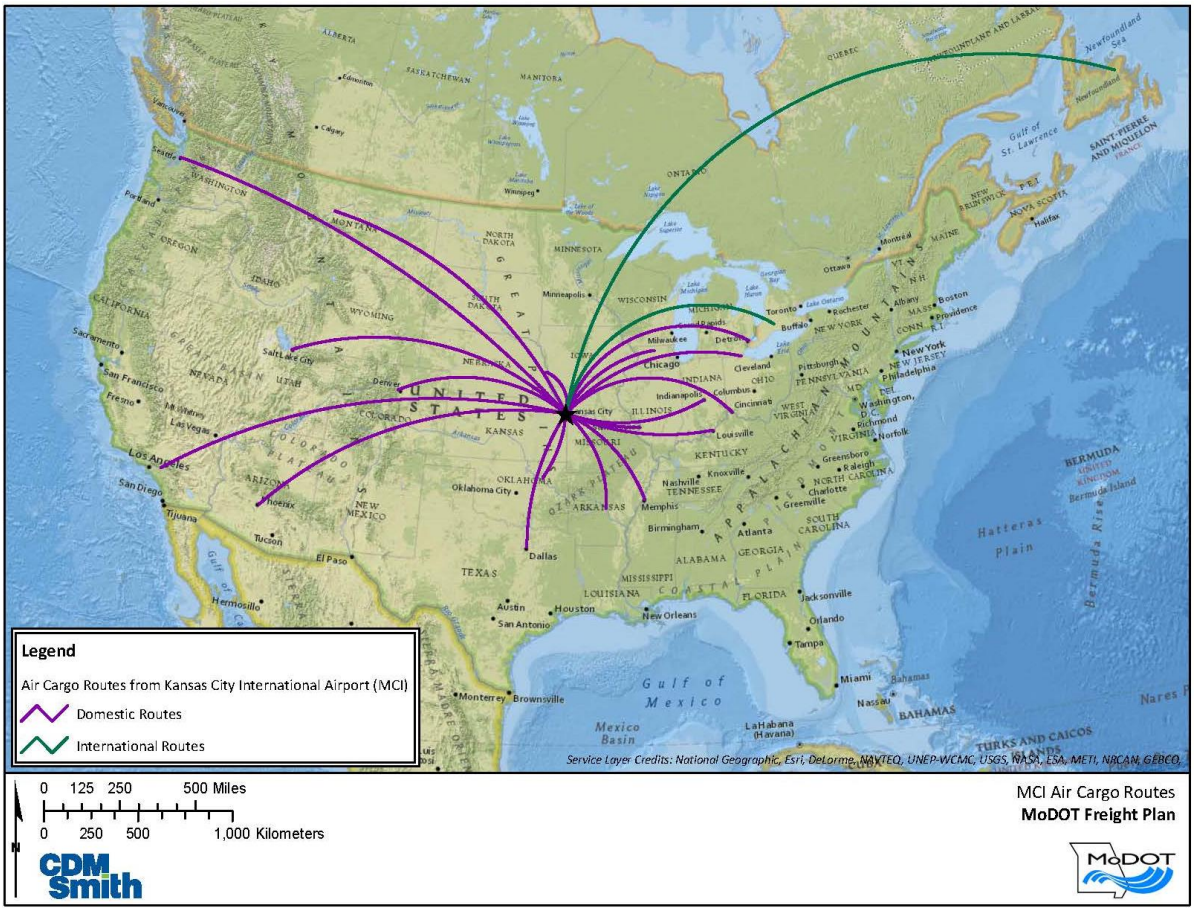
In addition to the cargo carriers at MCI, numerous passenger airlines provide cargo lift capacity on routes operated with wide-body passenger aircraft. These aircraft have space designed to hold cargo containers in the belly of the aircraft and serve international destinations in Canada and Mexico. MCI is a major hub for Southwest Airlines, which provides service to numerous domestic and international cities. Kansas City International's domestic and international air cargo routes are illustrated in **Table A-17** and **Figure A-16**.

Table A-17: Kansas City Air Cargo Destination Airports

Kansas City Air Cargo Destination Airports			
Kansas City to:	**Destination**	**Kansas City to:**	**Destination**
MCI to:	Cincinnati, OH	MCI to:	Memphis, TN
MCI to:	Dallas/Fort Worth, TX	MCI to:	Omaha, NE
MCI to:	Denver, CO	MCI to:	Ontario, CA
MCI to:	Detroit, MI	MCI to:	Phoenix, AZ
MCI to:	Great Falls, MT	MCI to:	Rockford, IL
MCI to:	Gander, Canada	MCI to:	Salt Lake City, UT
MCI to:	Indianapolis, IN	MCI to:	Seattle, WA
MCI to:	Little Rock, AR	MCI to:	St. Louis, MO
MCI to:	Louisville, KY	MCI to:	Toledo, OH
MCI to:	London, Canada	MCI to:	Tulsa, OK

Source: Bureau of Transportation Statistics, Research and Innovative Technology Administration, Internet Lookup, 2014

Figure A-16: MCI Domestic and International Air Cargo Routes



Source: Bureau of Transportation Statistics, Research and Innovative Technology Administration, Internet Lookup, 2014

Lambert-St. Louis International Airport

Lambert-St. Louis International Airport (STL) is situated on 2,800 acres of land and has four runways, the longest of which measures 11,019 feet in length. It is located approximately 10 miles northwest of St. Louis. It is the second busiest airport in Missouri in terms of annual air cargo tonnage, but the busiest airport in terms of passenger enplanements. In 2013, STL handled 64,557 tons of freight and mail, which ranks 56th in the U.S./North America.

STL is served by three major dedicated cargo airlines. Operators include integrated express carriers such as FedEx Express, UPS, and DHL. STL was formerly a major cargo hub, as the home base of Trans World Airlines (TWA), until the latter's absorption into American Airlines in 2001. TWA's St. Louis hub decreased after the merge due to its proximity to American Airline's larger hub at Chicago's O'Hare International Airport. As a result, STL went from 800 daily flights with TWA to having fewer than 200 daily flights with American. After the merge of TWA into American Airlines cargo tonnage at STL decreased from 130,000 tons in 2000 to 120,000 tons in 2002. MCI had a similar decrease in cargo from 2000-2002 (151,000 to 135,000).

Today's cargo area includes 231,500 square feet of fully-equipped cargo transit sheds, bonded warehouses, high-security warehousing, special handling facilities, freighter parking stands and direct ramp access.

In addition, numerous passenger airlines serving St. Louis provide cargo storage capacity on routes operated with wide-body aircraft. This cargo capacity is utilized primarily on international routes where wide-body aircraft are necessary. STL and its airlines serve the region with wide-body flights to many international destinations in Canada, Mexico, and China. Air Canada is an example of an international wide-body operator.

STL's location allows easy access to all forms of multi-modal transportation, while its immediate proximity to Foreign Trade Zone No. 102 allows businesses that utilize the zone to take advantage of significant cost savings.

Common goods shipped through STL include aerospace equipment, computers, auto parts, clothing and shoes, and paper products.

STL has wide-body passenger connections to Mexico, Canada, and China that operate passenger and belly cargo services. STL International's domestic air cargo routes are illustrated in **Table A-18** while its international air cargo routes are illustrated in **Figure A-17**.

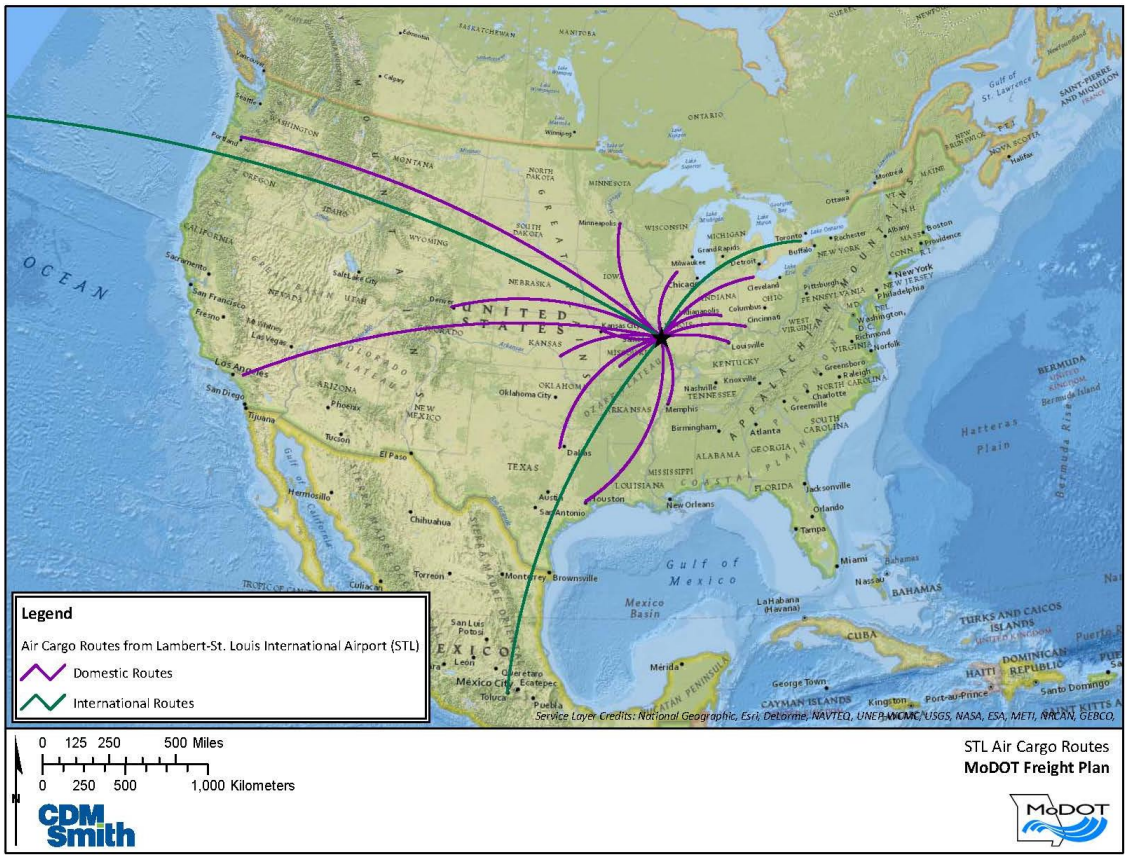
Table A-18: St. Louis Air Cargo Destination Airports

St. Louis Air Cargo Destination Airports	
Destination	**Destination**
Arlington, TX	Mexico City, Mexico
Cincinnati, OH	Minneapolis, MN
Denver, CO	Oakland, CA
Hamilton, Canada	Portland, OR
Houston, TX	Rockford, IL

Indianapolis, IN	Shanghai, China
Kansas City, MO	Springfield, MO
Louisville, KY	Toledo, OH

Source: Bureau of Transportation Statistics, Research and Innovative Technology Administration, Internet Lookup, 2014

Figure A-17: STL Domestic and International Air Cargo Routes



Source: Bureau of Transportation Statistics, Research and Innovative Technology Administration, Internet Lookup, 2014

Springfield-Branson National Airport

Springfield-Branson National (SGF) is located approximately 5 miles northwest of the City of Springfield, Missouri. SGF maintains one 7,003-foot runway and one 8,000-foot runway. It was the third busiest airport in Missouri by both passenger enplanements and annual air cargo tonnage. In 2013, SGF handled 12,693 tons, ranking 106th in the U.S. SGF has a Foreign Trade Zone (FTZ) designated facility on site. This means that foreign merchandise entering the FTZ can be re-exported, and in this case customs procedures are streamlined and tariffs do not apply.

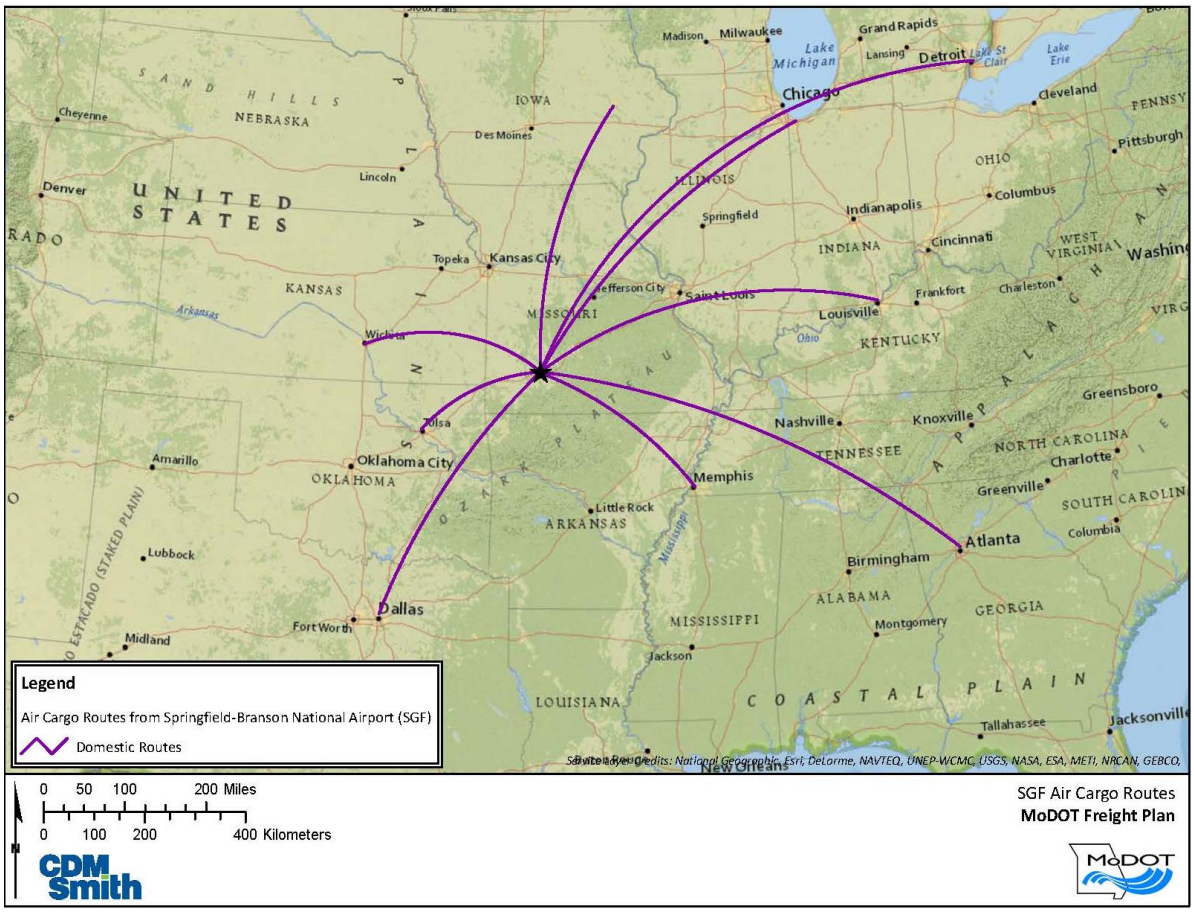
American Airlines, Allegiant Air, Delta, and United are the four passenger air carriers that provide air service from SGF to various destinations throughout the U.S. However, passenger airlines serving SGF currently do not provide major cargo service from this location. Springfield-Branson National's domestic air cargo routes are illustrated in **Table A-19** and **Figure A-18**.

Table A-19: Springfield Air Cargo Destination Airports

Springfield Air Cargo Destination Airports	
Destination	**Destination**
Atlanta, GA	Louisville, KY
Cedar Rapids/Iowa City, IA	Memphis, TN
Dallas/Fort Worth, TX	Tulsa, OK
Detroit, MI	Wichita, KS
Gary, IN	

Source: Bureau of Transportation Statistics, Research and Innovative Technology Administration, Internet Lookup, 2014

Figure A-18: Springfield Domestic Air Cargo Routes



Source: Bureau of Transportation Statistics, Research and Innovative Technology Administration, Internet Lookup, 2014

Pipeline

Approximately 10,700 miles of pipelines move natural gas, crude oil, and petroleum products throughout Missouri. **Table A-20** lists the number of pipeline miles by commodity. The U.S. DOT Pipeline and Hazardous Materials Safety Administration (PHMSA) regulates pipeline transport. The Office of Pipeline Safety (OPS – within PHMSA) inspects and enforces interstate pipeline safety regulations and certifies State representatives, through the Missouri Public Service Commission, for intrastate inspection.

Table A-20: Missouri Pipeline Transmission Mileage by Commodity

Missouri Pipeline Transmission Mileage by Commodity	
Commodity	**Pipeline Miles**
Natural Gas	4,587
Refined Products	2,046
Crude Oil	1,591
Liquefied Petroleum Gas HVL	1,132
Empty Liquid	790
Anhydrous Ammonia HVL*	420

Natural Gas Liquids HVL*	**153**
Total Pipeline Miles	**10,719**

**HVL=highly volatile liquid*
Source: http://primis.phmsa.dot.gov/comm/reports/safety/MO_detail1.html?nocache=6500#_OuterPanel_tab_5
Accessed on February 5, 2014

The highest percentages of pipeline miles, according to PHMSA Missouri Incident and Mileage Overview, are in St. Charles County (4.9 percent), Cass County (3.6 percent), Audrain County (3.5 percent), and Johnson County (3.4 percent), which are located in the northern half of the State where the majority of major pipelines pass.[19]

There are several major crude oil, petroleum product, and liquefied petroleum gas pipelines traversing the State as identified by the PHMSA. Many of the crude oil and petroleum product pipelines originate near the Gulf Coast (Texas) and Oklahoma, as well as Canada, and pass through the State en route to Midwest refineries, including the Wood River, Illinois, refinery across the Missouri border near St. Louis. Natural gas supplies are primarily from the south-central U.S. and Rocky Mountain region including Oklahoma, Texas, and Colorado. **Table A-21** lists the major pipelines in Missouri and their extents and **Figure A-19** shows their locations.

The Energy Information Administration (EIA) maintains a database of recently completed and upcoming U.S. natural gas pipeline projects. No future projects in Missouri have been announced. TransCanada's proposed Keystone XL pipeline would connect to the existing Keystone Pipeline in Steele City, Nebraska, and increase access to Midwest markets. The project is currently awaiting decision on a Presidential Permit application. Enbridge is currently constructing the Flanagan South Pipeline Project adjacent to their Spearhead pipeline to provide more efficient transportation of oil from western Canada and North Dakota to refinery hubs in the Midwest and Gulf Coast. The Flanagan South line is planned to be in service by the end of 2014.

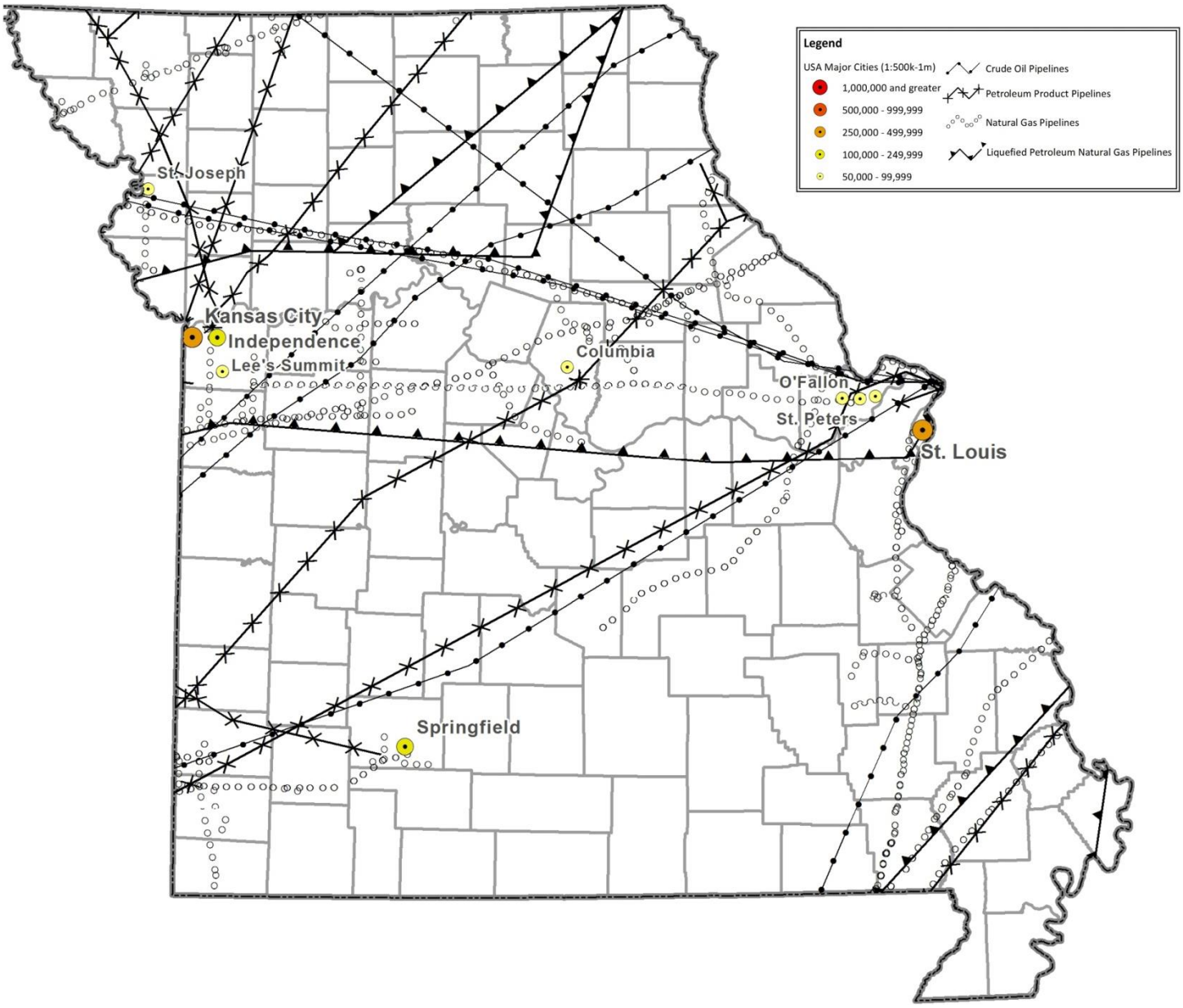
[19] http://primis.phmsa.dot.gov/comm/reports/safety/MO_detail1.html

Table A-21: Major Missouri Pipelines-Locations and Operators

Major Pipelines in Missouri			
	Operator	Pipeline Name	Missouri Extents (approx.)
Crude Oil	Koch Pipeline	MinnCan	Bethany to Wood River, IL
	ExxonMobil	Pegasus	Doniphan to Perryville
	Enbridge	Ozark	Joplin to St. Louis
	Enbridge	Spearhead	Drexel to Palmyra
	BP Pipelines	Cushing to Whiting	Drexel to Kahoka
	Spectra Energy	Platte	St. Joseph to Wood River, IL
	TransCanada	Keystone	St. Joseph to Wood River, IL
Petroleum Product	Enterprise	TeppCo	Campbell to Cape Girardeau
	Explorer Pipeline	Houston to Wood River	Joplin to Wood River, IL
	Midstream Partners	Magellan	Lamar to Springfield
	Midstream Partners	Magellan	Lamar to Hannibal
	Midstream Partners	Magellan	St. Joseph to Albany
	Midstream Partners	Magellan	Kansas City to Bethany
	Buckeye Partners	Buckeye	Tarkio to Kansas City to Unionville
Liquefied Petroleum Natural Gas	Enterprise Products	TeppCo	Doniphan to Cape Girardeau
	Enterprise Products	Centennial	New Madrid to Charleston
	Enterprise Products	East Leg	Platte City to Memphis
	Conoco Phillips	Blue Line	Drexel to Wood River, IL
Natural Gas	Panhandle Energy	Panhandle East	Drexel to Louisiana
	Tallgrass	Rockies Express (REX)	St. Joseph to Louisiana
	TransCanada	ANR Pipeline	Mound City to Bethany
	Southern Star Central Gas	–	Drexel to St. Peters
	MoGas Pipeline	–	Waynesville to St. Louis to Bowling Green
	Enable Midstream Partners	Mississippi River Transmission	Doniphan to Farmington/St. Louis
	KinderMorgan	Natural Gas Pipeline Co. of America	Doniphan to Jackson
	Spectra Energy	Texas Eastern Transmission	Campbell to Cape Girardeau

Source: http://www.eia.gov/state/?sid=M and http://www.eia.gov/state/data.cfm?sid=MO#DistributionMarketing
Accessed on February 5, 2014

Figure A-19: Major Pipelines in Missouri



Intermodal Facilities

The National Transportation Atlas Data through the Bureau of Transportation Statistics identified 110 intermodal facilities located in Missouri that provide a variety of intermodal interactions. The majority of the intermodal facilities (73 percent) accommodate rail – truck commodity transfers followed by modal transfers at ports (13 percent) and airports (7 percent) as shown in **Table A-22**.

Table A-22: Number and Percent of Missouri Intermodal Facilities

Intermodal Facilities by Type		
Intermodal Type	**Number of Facilities**	**Percent of Total Intermodal Facilities**
Rail – Truck	82	71.3%
Port – Truck/Rail	18	15.7%
Air – Truck	9	7.8%
Truck - Truck	6	5.2%
Total	115	100.0%

Source: Bureau of Transportation Statistics

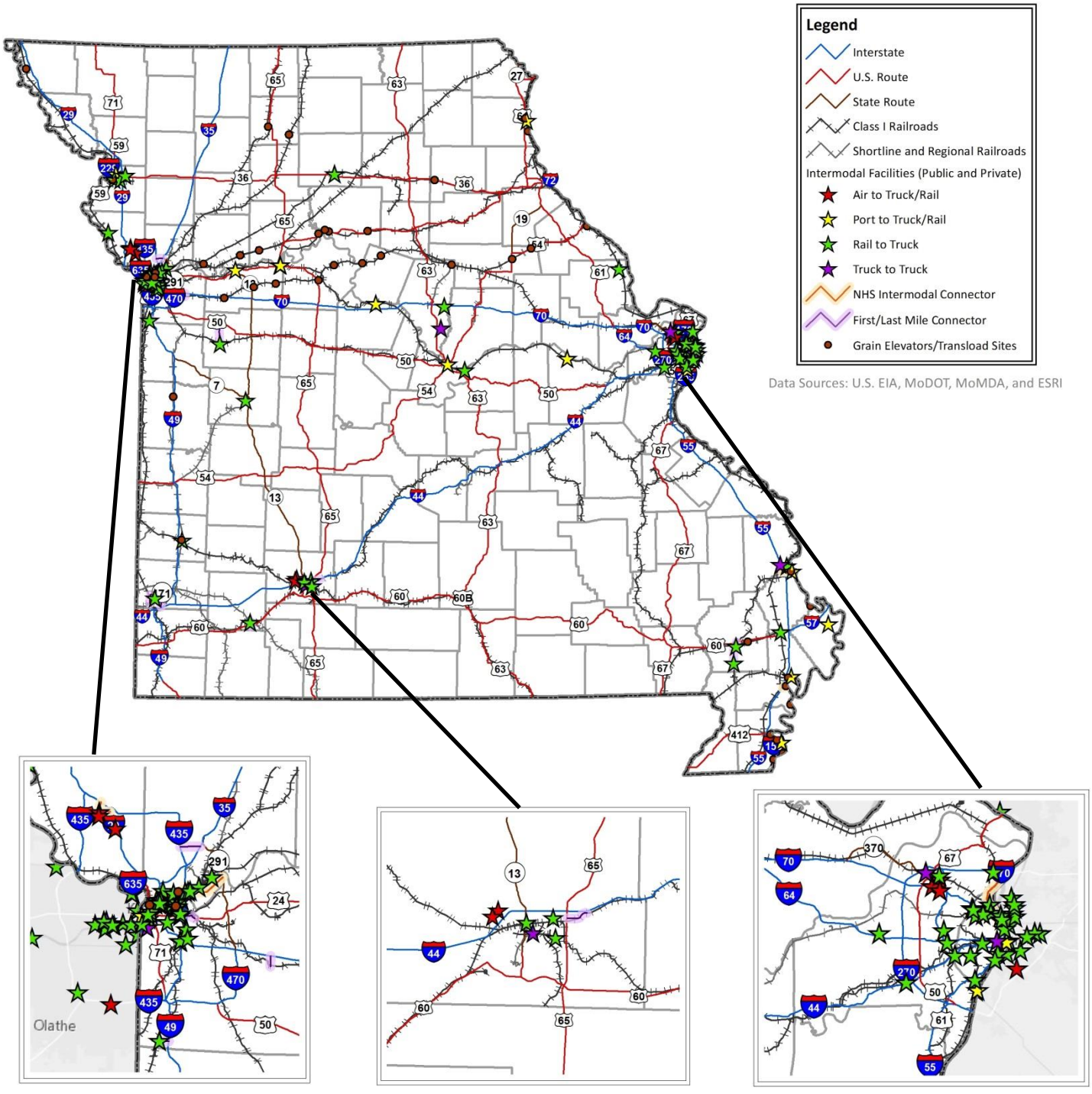
The majority of the intermodal activity occurs in the metropolitan areas; see **Table A-23**. The Kansas City area has 47 while St. Louis has 30 of the intermodal facilities. Springfield (six) and St. Joseph (four) also have smaller clusters of intermodal facilities. The remaining 28 intermodal facilities are dispersed throughout the State. The intermodal facilities are shown in **Figure A-20.**

Table A-23: Missouri Intermodal Facilities by Location

Intermodal Facilities by Location		
Intermodal Facility Location	**Number of Facilities**	**Percent of Total**
Kansas City	47	40.9%
St. Louis	30	26.1%
Springfield	6	5.2%
St. Joseph	4	3.5%
Rest of State	28	24.3%
Total	115	100.0%

Source: Bureau of Transportation Statistics

Figure A-20: Intermodal Facilities



Freight Generators

American Transportation Research Institute (ATRI) analyzed truck Global Positioning System (GPS) data from Missouri to identify census block groups where freight activity is most intense. The output from this analysis provides insight regarding the source locations of freight movement. The ATRI *Missouri Freight Generators Analysis* is located in Attachment B.

The goal of this analysis is to identify geographic locations (at the block group level) where freight is generated. Such locations include distribution centers, warehouses, manufacturing facilities and other origins and destinations. These locations were identified based on the intensity of truck activity within block group.

To conduct the analysis, a truck GPS dataset was first assembled that included data for four months (February, May, August, and November) in 2013. The dataset was limited to points inside the boundary of Missouri; within Missouri, there were no geographic limitations.

Using a sample of this dataset, ATRI identified 400 freight-significant block groups out of a total of 4,506 in the State based on truck GPS data activity within each block group. ATRI's sample included only stopped trucks to identify 400 block groups with the greatest freight intensity. This identification allowed the research team to filter the larger statewide dataset and focus on only on data from freight generators.

The next step was to identify the 100 most intense freight generators among the 400 block groups. To do this, a second filter was employed. Data points that fell on major roadways or at truck stops were removed from the dataset using various GIS based filters. After this process, which took advantage of available proprietary GIS layers (e.g. roadway networks), additional manual reviews were conducted using aerial imagery to identify data that fell within a block group but outside of a freight generator. The end result was a dataset that included only vehicle GPS positions within the vicinity of a freight generator facility. The process resulted in a refined truck position data set that identified, based on number of position reads, a set of 100 top freight generator block groups.

Figure A-21 depicts the 100 freight generators identified through this analysis. Each of the 100 locations is shown in orange. The analysis found that the majority of key freight generators were located along major roadways. Furthermore, urban areas such as St. Louis and Kansas City contained the highest share of generators, although several other freight generating locations were identified throughout the State. The final two figures depict the freight generator locations in greater detail for the Kansas City (**Figure A-22**) and St Louis (**Figure A-23**) metro areas. The freight generators were divided into five tiers with Tier 1 being the most active generators and Tier 5 having less activity based on the ATRI truck GPS data.

This information can be used by MoDOT, in conjunction with an analysis on truck bottlenecks, to prioritize infrastructure investments that will improve mobility in the State. In particular, this information may be valuable for identifying the investment needs of critical last-mile connectors.

Figure A-21: Top 100 Identified Freight Generators: Census Block Groups

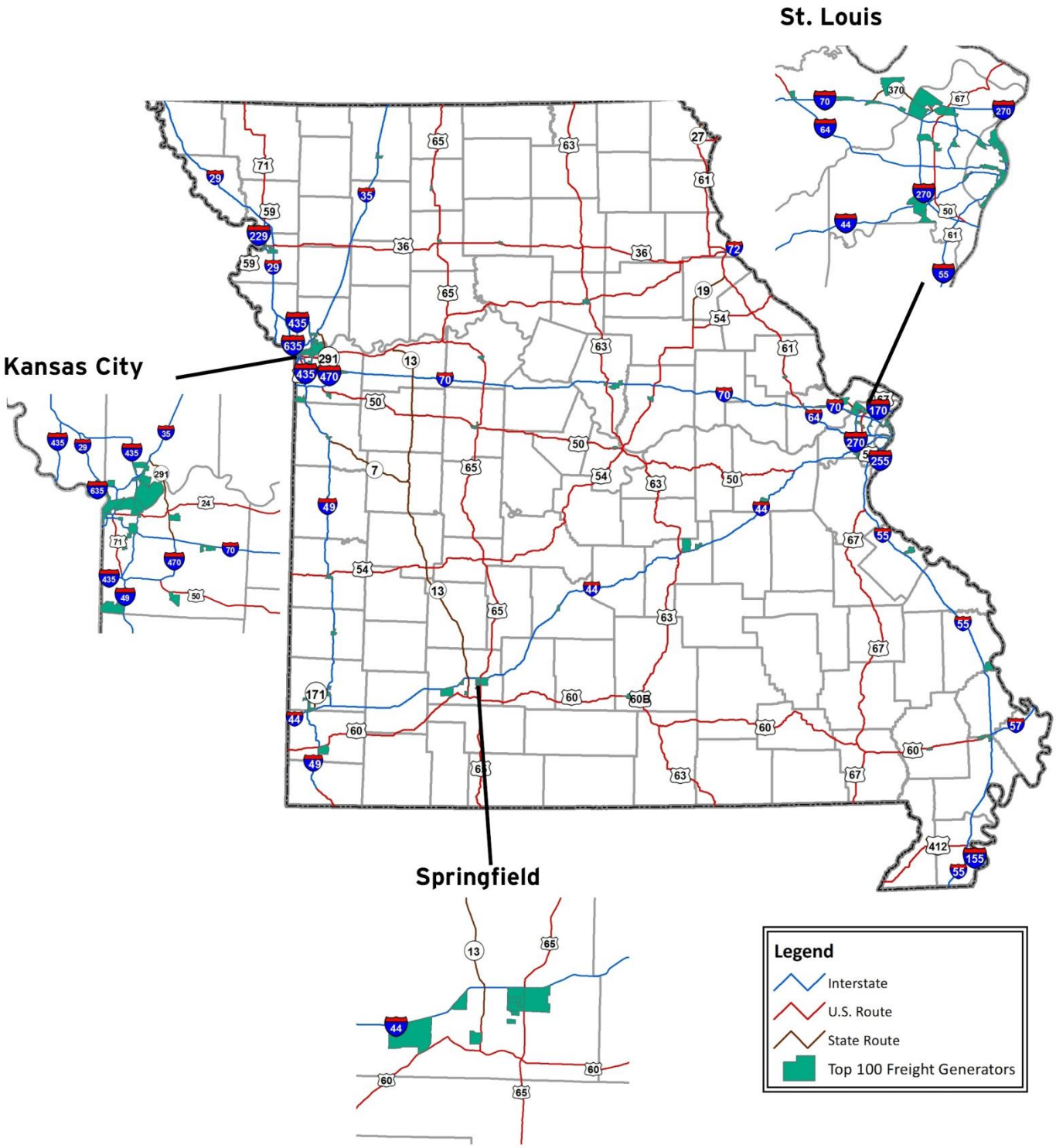


Figure A-22: Top 100 Freight Generator Census Blocks: Kansas City Detail

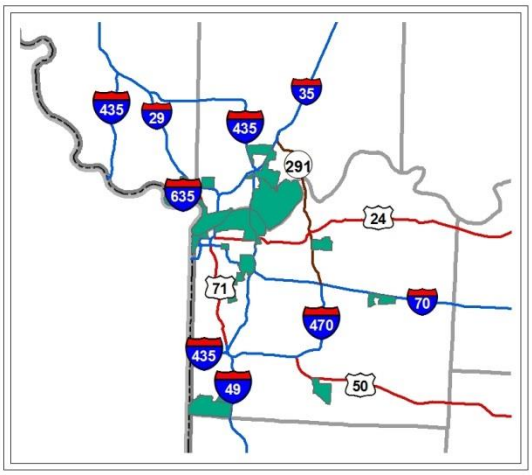
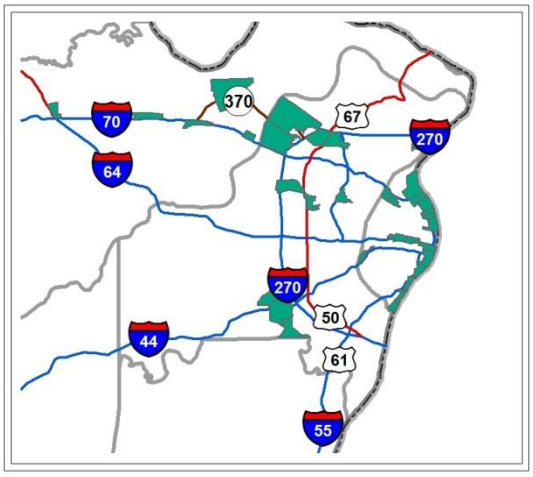


Figure A-23 Top 100 Freight Generator Census Blocks: St Louis Detail



Freight System Condition and Performance

This section discusses the existing and future condition, performance, and safety of Missouri's freight system.

Condition

Highway Conditions

MoDOT began an initiative in 2004 that focused on improving major highways. MoDOT set a target of 85 percent of major highways in good condition. Since 2009 when Tracker was implemented, Missouri major highways have exceeded the State target. In 2013, the nearly 90 percent of Missouri's major highways were in good condition which includes over 91 percent of the Interstates.

With a focus on major highways, the minor road system conditions declined in the early years of that program, with 60 percent of the minor roads in good condition in 2009. Since this date the minor road conditions have trended upward to the 2013 mark of over 78 percent of the minor roads in good condition. However, this trend has not continued and conditions have trended downward since 2013.

Highway Restrictions

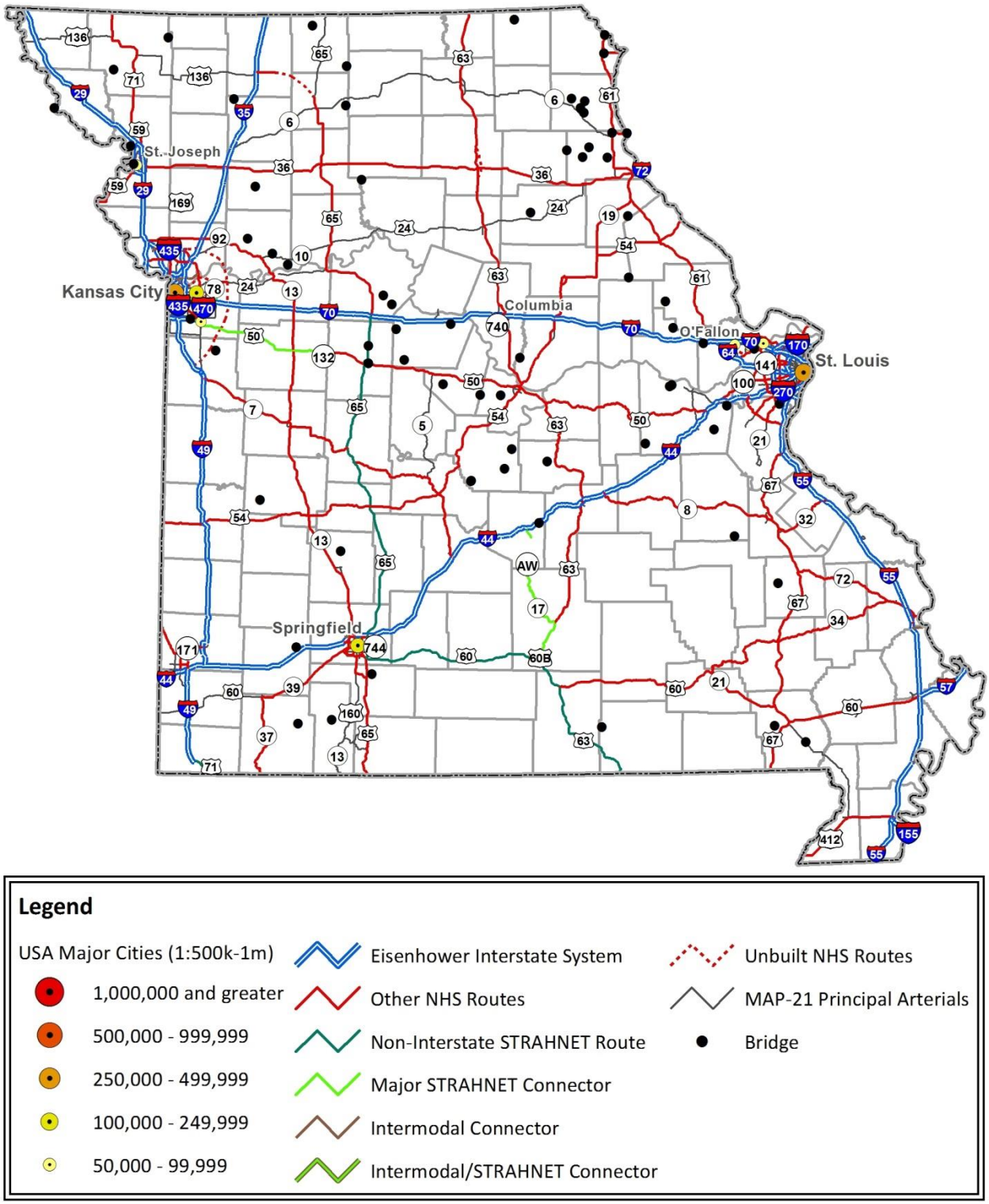
Truck traffic is often restricted on highways due to low clearances at overpasses and weight restrictions on bridges. Current limits for vehicles which travel on MoDOT roadways without oversize or overweight permits reported on the MoDOT website are:

- Width – 8 feet 6 inches
- Height – 14 feet
- Gross Weight - 80,000 pounds maximum

There are a total of 73 low vertical-clearance bridges in Missouri. This represents less than one percent of all bridges in the State. None of these bridges cross interstates and four bridges (five percent) cross U.S. highways. **Figure A-24** shows the locations of these low clearance bridges.

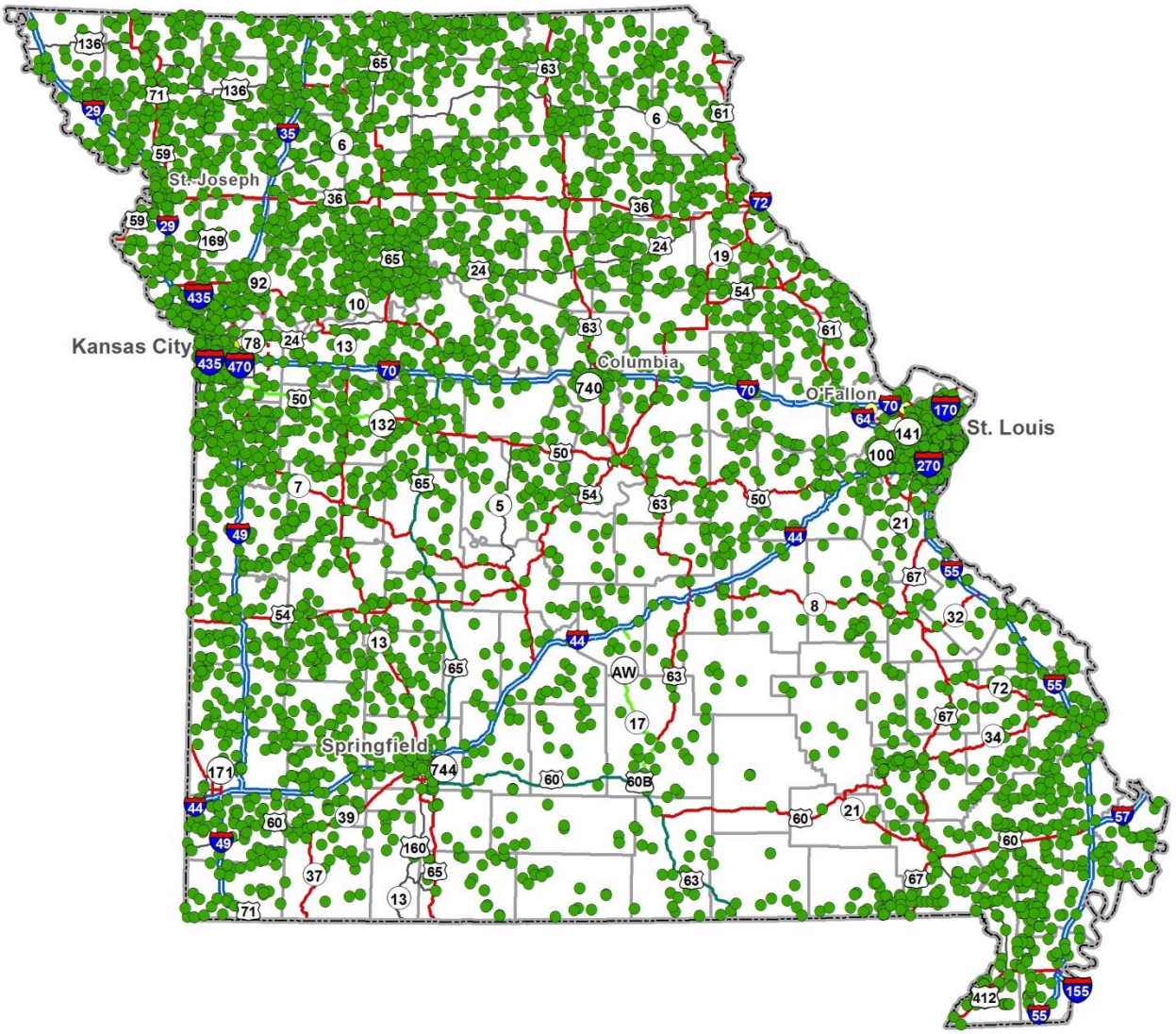
In addition to the low clearance bridges there are 4,849 load-restricted bridges in Missouri. This is about 20 percent of all bridges in the State. One hundred and thirty-five (three percent) of these bridges cross interstates and 81 (two percent) cross U.S. highways. **Figure A-25** shows the locations of these load-restricted bridges. Forty-four of these load-restricted bridges are also low clearance bridges.

Figure A-24: Low Clearance Bridges in Missouri



Data Sources: USDOT BTS, USDOT FHWA, MoDOT, and ESRI

Figure A-25: Load-Restricted Bridges in Missouri



Data Sources: USDOT BTS, USDOT FHWA, MoDOT, and ESRI

Waterway Characteristics/Operations

Waterways are the original Missouri transportation system. This resource led to wealth and development that then spread outward from Missouri's rivers. A "standard' tow is 15 barges with a capacity of 22,500 tons or 45 million pounds. "Large" tows on the Mississippi below St. Louis can be as large as 40 barges. It would take two 100 railroad cars or 870 semi-trucks to carry the same amount of cargo as a standard tow. Unlike trucks, tows can carry a lot of cargo with relatively few crewmembers. Additionally, waterways are inherently grade-separated from highways and railways; thus, they do not cause congestion in other modes. When waterborne cargo is used instead of trucking, it saves fuel and improves highway conditions including safety, reduced congestion, pavement life and reduced emissions. Reducing fuel and labor costs reduces transportation costs, improving profits commercially and agriculturally.

Waterways are comparable in capacity and importance to interstate highways. Annual cargo through Missouri's ports is worth billions of dollars. Assets of public ports are comparable to industrial parks.

Performance

Truck Bottlenecks

The Freight Performance Measures (FPM) database compiles anonymous trucking operations data from several hundred thousand trucks using GPS data from onboard trucking systems – generating billions of data points annually. Each truck used in FPM analysis has a regular position read (generally every 1 to 15 minutes) and includes information on vehicle location, unique vehicle identification, time/date, and, in many cases, vehicle spot speed (which is obtained from the vehicle's engine). Through these attributes, ATRI performs spatial queries and relates the FPM truck GPS data to a variety of transportation datasets using customized software and proprietary database management workflows.

The truck GPS data from February, May, August, and November of 2013 was aggregated, generating an average speed and a count of position reads (i.e. sample size) for each hour of the day across all 3,311 segments. Average hourly speeds were aggregated into four time periods to produce a statewide speed profile by time of day:

- Morning Peak (6:00 to 9:59 a.m.)
- Midday (10:00 a.m. to 2:59 p.m.)
- Evening Peak (3:00 p.m. to 6:59 p.m.)
- Off-peak (7:00 p.m. to 5:59 a.m.)

The difference in travel time for each period compared to the off-peak travel time was multiplied by the per-mile size of the sample for that period and the values for the three periods were added together to generate the total congestion index. The 100 segments with the highest congestion indices were isolated for further analysis as the top trucking bottlenecks in Missouri. The following sections present the results of the statewide speed profile and the analysis of the top 100 truck bottleneck locations. The average speed by time of day was the primary input to the bottleneck analysis. However, it was also necessary to utilize an indicator of volume in the bottleneck analysis to ensure that roads with

moderate to heavy truck volume were more heavily weighted in the bottleneck analysis than roads with little to no truck traffic. The Missouri Congestion Analysis performed by ATRI is in Attachment C.

ATRI generated a congestion index for each network segment. The 100 segments with the highest congestion index were isolated for additional analysis as the most severe truck bottlenecks in Missouri. **Figure A-26** presents the 100 segments identified as bottlenecks through this analysis. St. Louis and Kansas City contained 81 out of the state's 100 worst truck bottlenecks; however, Springfield also contained several bottlenecks, as did other cities and towns across the State.

Figure A-27 provides a more detailed view of the St. Louis area, which contained 59 out of 100 bottlenecks. The most severe bottlenecks appear to be concentrated near the confluence of Interstates 70, 64, 55, and 44 near downtown St. Louis. Other problem areas include I-270 on the west side between I-64 and I-44 and again on the north side near I-170. I-70 was also problematic west of I-270 and again west of MO-370. Additionally, segments of I-64 west of I-270 made the bottleneck list. Several arterials also experienced a high level of delay, including Kingshighway Boulevard, Grand Boulevard, Arsenal Street, MO-115, and MO -180.

Figure A-28 highlights the 22 bottlenecks identified in the Kansas City area. The analysis revealed two primary bottleneck clusters and several other isolated bottlenecks. The complex intersection with I-70, I-670, I-35, and MO-9 generated a truck bottleneck along all of those routes near downtown Kansas City. Additionally, Front Street and the Chouteau Freeway, which are located near a major rail facility, were among the worst bottlenecks in the State. Beyond those two bottleneck clusters, other problem areas include I-70 east of I-435, I-435 west of I-470, I-35 north of MO-291, US-71 between 75th Street and 55th Street, and 23rd Street between I-70 and I-435.

Figure A-29 illustrates the seven bottlenecks identified in the Springfield area. The most severe bottleneck in the area was located on MO-744 (E. Kearney Street) between US-65 and N. Glenstone Avenue. A small portion of US-160 south of I-44 also ranked highly on ATRI's analysis. Other bottlenecks include portions of MO-13, the Chestnut Expressway from MO-13 to US-65 (partially signed I-44 Business), and US-65 Business from the Chestnut Expressway to East Sunshine Street.

Beyond the urban areas of St. Louis, Kansas City, and Springfield, several other truck bottlenecks were identified throughout Missouri. **Figure A-30** presents the remaining bottlenecks in the state, which includes:

- US-169 between I-29 and US-36 near St. Joseph (Inset 1)
- MO-163 south of I-70 in Columbia (Inset 2)
- US-60 Business between US-54 and US-50 in Jefferson City (Inset 3)
- I-44 east of Rolla (Inset 4)
- US-67 Business in Poplar Bluff (Inset 5)
- US-60 east of I-49 near Neosho (Inset 6)
- Several segments of US-71 near the Arkansas border (Inset 6)
- Portions of I-49 Business and MO-171 near Joplin (Inset 7)
- MO-7 and MO-13 in Clinton (Inset 8)

Appendix A: Assets and Freight Flow Technical Memo

Figure A-26: 100 Most Congested Trucking Bottlenecks in Missouri

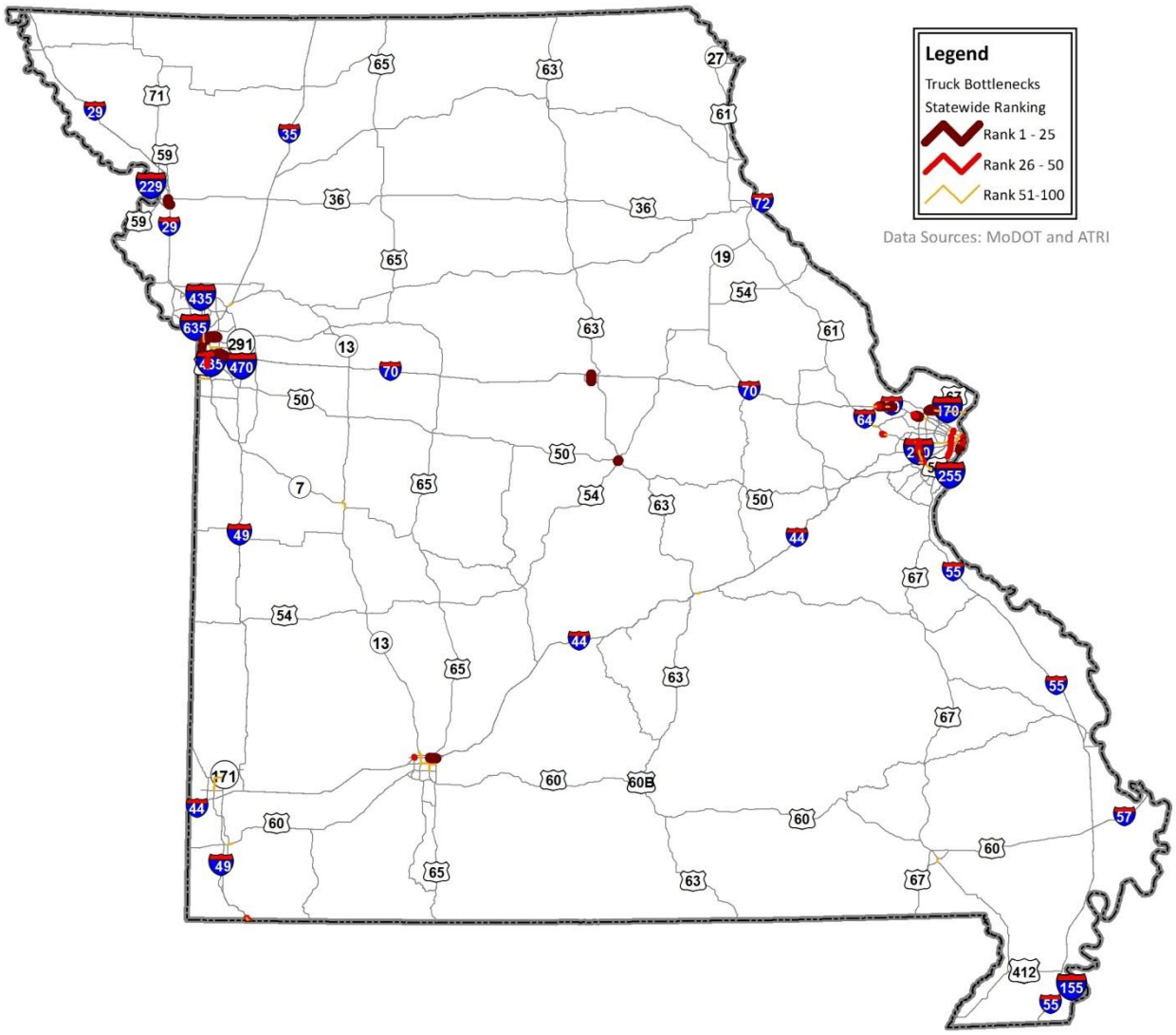


Figure A-27: Most Congested Trucking Bottlenecks in St. Louis

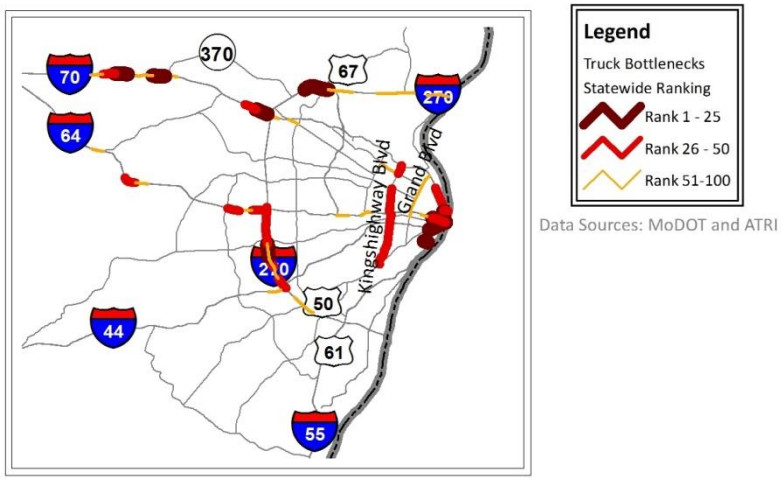


Figure A-28: Most Congested Trucking Bottlenecks in Kansas City

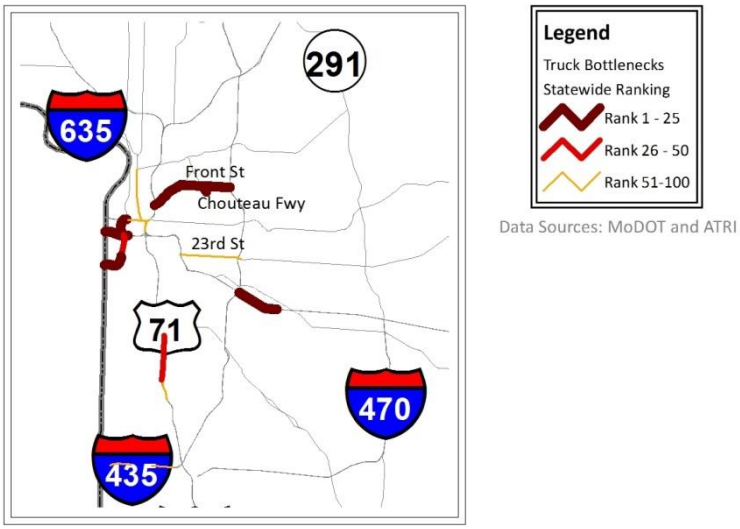


Figure A-29: Most Congested Trucking Bottlenecks in Springfield

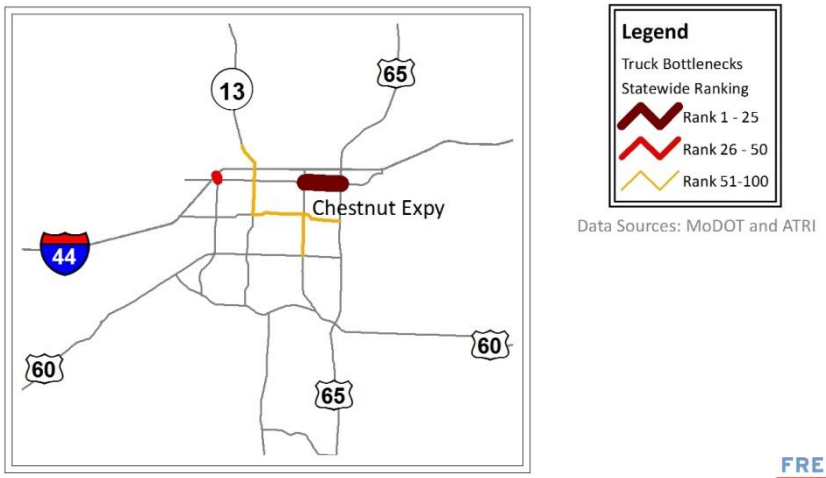
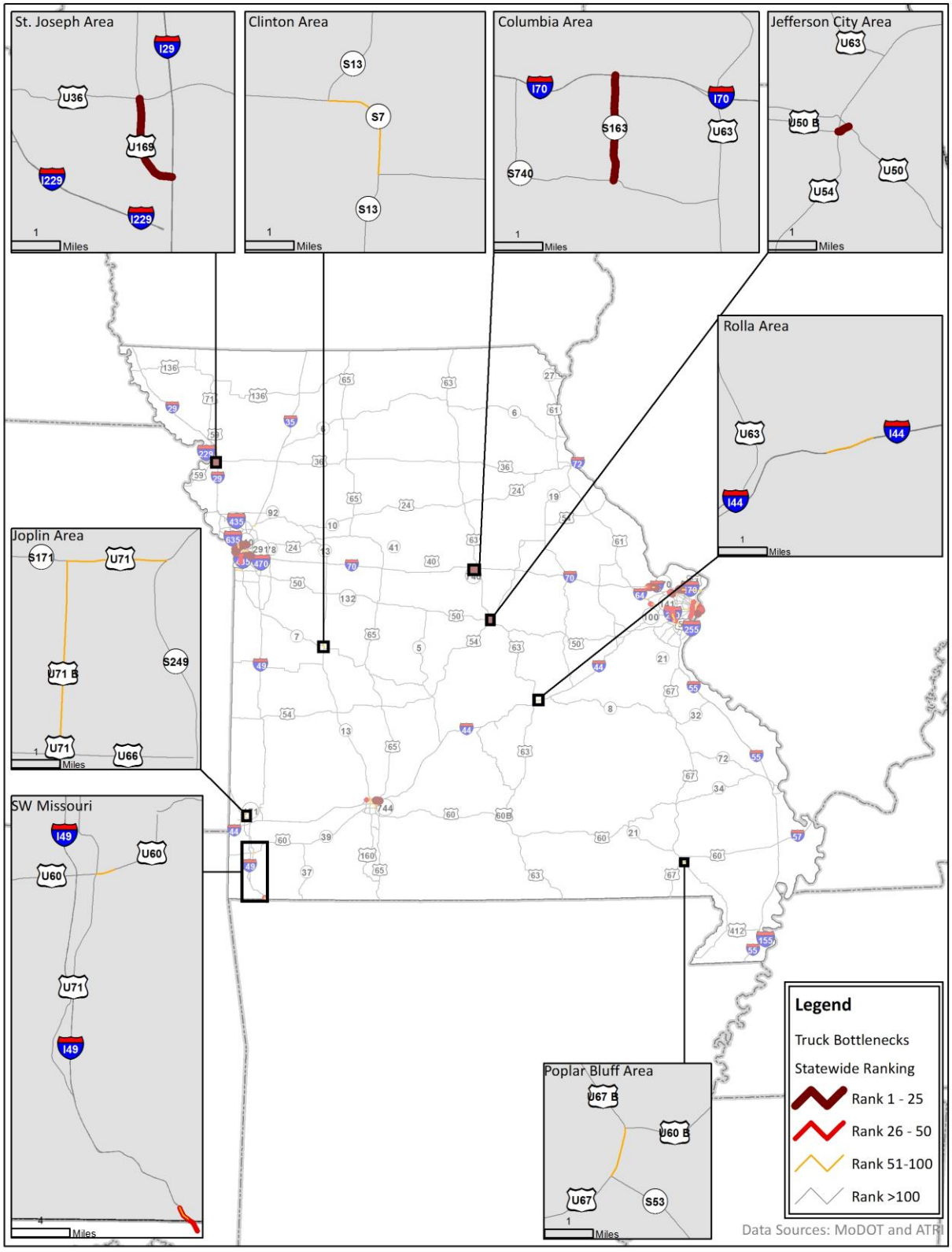


Figure A-30: Other Truck Bottleneck Locations in Missouri



Rail Bottlenecks

Appendix A: Assets and Freight Flow Technical Memo

The National Rail Freight Infrastructure Capacity and Investment Study prepared by the Association of American Railroads (AAR) has developed a methodology for determining the level of service for a specific freight rail corridor. The basis for determining the level of congestion on a rail corridor is a calculated volume-to-capacity ratio. To determine the ratio, many system attributes are factored in, including: number of tracks, yard capacity, siding length, track speed, locomotive type, and terrain. Since this is a statewide, high-level study of rail capacity in Missouri, three factors - ratio number of tracks, train control system and train type - are used in determining current capacity.

The following is a summary of the 2012 level of service based on the volume to capacity (V/C) of the rail line for railroads operating in Missouri.[20] Some of this level of service data may have changed since 2012 due to the economy and demand of specific goods.

Volume Approaching Capacity (0.8 - 1.0)

1. MNA – Aurora Sub (from Carthage to Arkansas State line to south)
2. BNSF – Fort Scott Sub (from Springfield to Kansas State line to west)
3. BNSF – Brookfield Sub (from Kansas City to Iowa State line to northeast)
4. BNSF – Hannibal Sub (from St. Louis to Iowa State line to northeast)
5. KCS – Pittsburg Sub (from Kansas City to Kansas State line to southwest)
6. Terminal Railroad Association of St. Louis (from I-170 to Illinois State line to east)
7. UP – Sedalia Sub (from I-435 to Kansas State line to west)

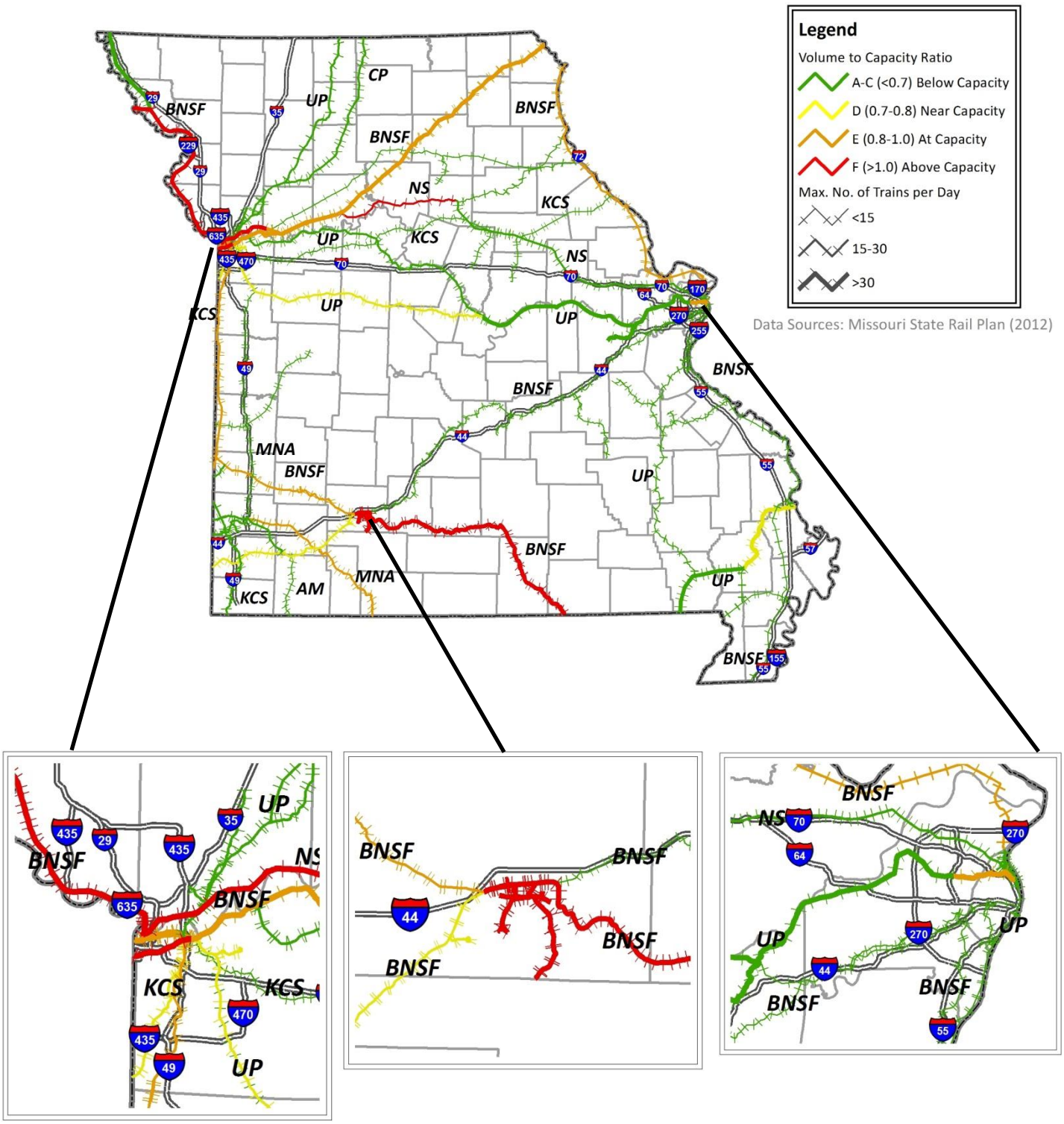
Volume Exceeding Capacity (> 1.0)

1. BNSF – Thayer North Sub (from Springfield to Arkansas State line to south)
2. BNSF – St. Joseph Sub (from Kansas City to Nebraska State line to northwest)
3. UP – Chester Sub (from Dexter to Illinois State line to east)
4. UP – Hoxie Sub (from Dexter to Arkansas State line to south)
5. UP – Sedalia Sub (from Jefferson City to Kansas City)
6. NS – Kansas City District (from Moberly to Kansas City)
7. Kansas City Terminal Railroad (from I-435 to Kansas State line to west)

The map in **Figure A-31** illustrates the volume-to-capacity ratio and the maximum number of trains per day for each freight rail corridor in Missouri. The Interstate highways are also shown for reference.

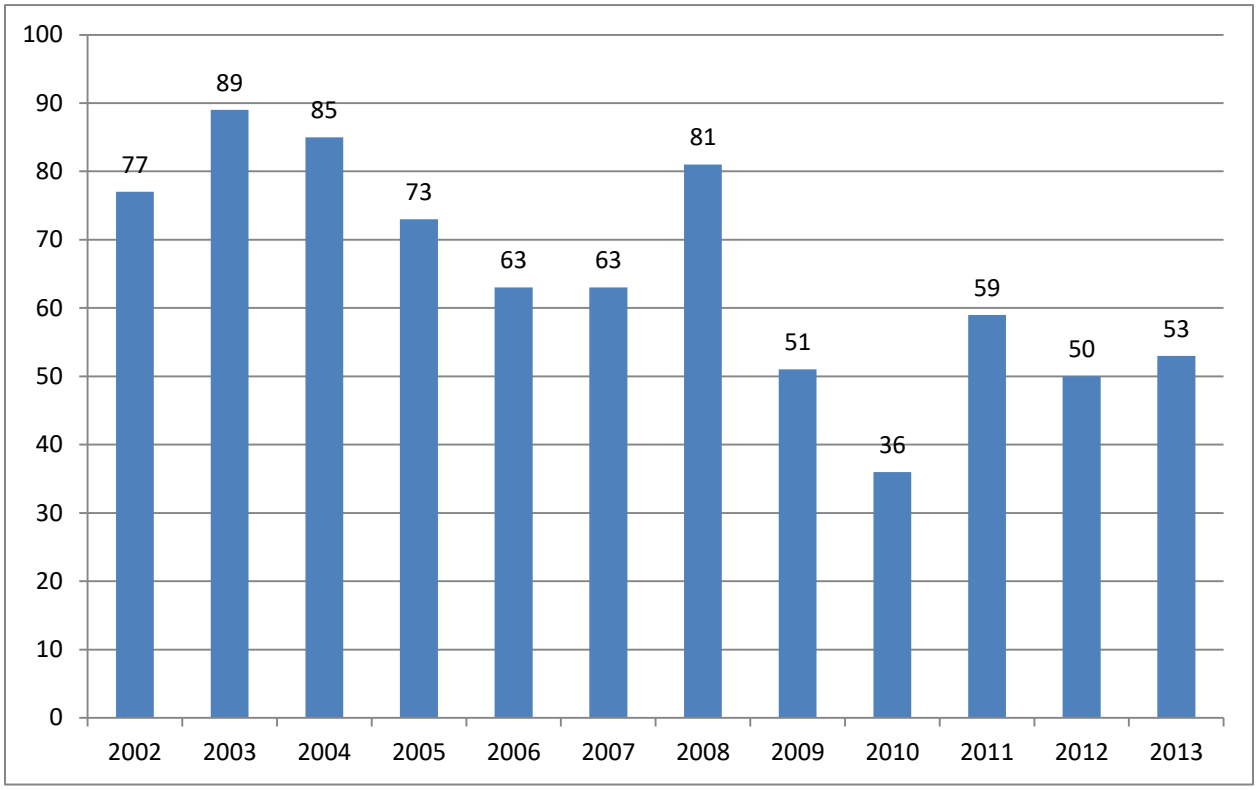
[20] Missouri State Rail Plan, MoDOT, 2012

Figure A-31: Rail Corridor Volume to Capacity



MoDOT and Missouri's railroad operators understand and promote the importance of railroad safety. MoDOT's website, for example, has rail safety information designed for schools, communities, commercial drivers, driver education programs, and other interested parties. Here people can learn more about railroad grade crossing hazards and safety issues, while also learning more about how to avoid becoming involved in an accident. A train accident can be defined as an event resulting in monetary damage to track and/or on-track rail equipment. This definition does not include lading, clearing costs, and environmental damage. Total accidents/incidents generally represent the sum of train accidents, highway-rail incidents, and other incidents. Other incidents include any event causing a death, an injury or an occupational illness to a railroad employee. The rail vehicle accident/incidents since 2002 are shown in **Figure A-32**.

Figure A-32: Accidents/Incidents in Missouri



Source: http://safetydata.fra.dot.gov/OfficeofSafety/publicsite/on_the_fly_download.aspx

Waterway Issues

Three public port authorities located along the Missouri River have identified improvements of the river's navigation facilities as important. The Missouri River has a large potential to serve most of Missouri farmers. There are eight authorized purposes for the Missouri River and balancing water flow out of the dams to serve all eight has given the Missouri River a reputation for unreliable navigation over the last few years. However, as we are seeing this year, freight is again moving on the MO River as capacity issues on the rail and highway have necessitated the development of additional modes of transporting agricultural products to market.

There is concern from public and private ports about restrictions to floodplain development since all ports are on riverbanks. This issue has contributed to the lack of infrastructure to handle freight. Missouri River port authorities have concerns about Missouri River cargo going through other states instead. To stay in business port authorities are primarily focused on businesses that do not depend solely on waterways.

Container-On-Vessel (COV)

Port authorities, government agencies, and shippers look to the feasibility of COV service to enhance existing truck and rail transport. COV is cost-effective for shippers when measured by unit, operation and labor costs when compared to rail and truck. Potential obstacles to greater use of COV in Missouri include: readiness of ports, delivery requirements for ports to sustain service, and inefficiencies in backhauling empty containers.

Initiation of COV service depends on the development of partnerships between key port operators and shipping stakeholders, including navigators, manufacturing, and logistics firms. According to "Missouri Public Port Authorities: Assessment of Importance and Needs" – all current port facilities, with limited capital investments, could operate as a COV facility.[21]

Safety

The three year crash rate (2010 – 2012) was calculated for highway segments proposed for the Missouri freight network based on 100 million vehicle miles traveled (HMVMT).[22] The crash rates were developed bi-directionally for each segment. The segments were separated by interstates and all other routes which comprised a combination of U.S. highways and a few Missouri routes. This separation was maintained throughout the analysis since interstates generally have lower crash rates than other route designations. The interstates were divided into 55 segments resulting in 110 bi-directional segments. The U.S. highways and Missouri routes had 57 segments with 114 bi-directional segments.

After the three-year crash rates were calculated, the interstates were divided into four tiers with Tier 1 representing the highest interstate segment crash rates. The top three segments for interstates and U.S./MO routes are shown in **Table A-24**. The same process was completed for the U.S. highways and Missouri routes. The results of this analysis are shown in **Figures A-33** and **A-34**.

[21] Missouri Public Port Authorities: Assessment of Importance and Needs, MoDOT, March 2006.
[22] MoDOT 2010-2012 Crash Data, CDM Smith analysis

Table A-24: Top Interstate and U.S./MO Route CMV Crash Rate Locations

Top Interstate and U.S./MO Route CMV Crash Rate Locations			
Interstate Segment	**Direction**	**To**	**From**
I-55	North	I-44	I-70
I-55	South	I-70	I-44
I-29	South	I-435 (north)	I-35 split
U.S./MO Route Segment	**Direction**	**To**	**From**
MO 13	South	I-44	US-60
MO 210	East	I-435	MO 291
MO 13	North	US-60	I-44

Source: CDM Smith

There are segments of interstates, mostly within urban areas, that are in Tier 1. Sections of I-70, I-35, I-29, and I-435 in Kansas City are in Tier 1, as are small segments of I-70, I-64, I-55, and I-270 in St. Louis and segments of I-29 and I-229 in St. Joseph. In addition to these urban areas, there is a segment of I-44 near the Oklahoma border in Tier 1.

Larger segments of U.S. highways and Missouri routes are also within Tier 1 and, compared to the Interstates, are mostly outside of the urban areas.

- Southbound US-65 from Iowa border to US-54
- US-50 from US-65 to US-54
- Westbound US-50 from US-54 to I-44
- Southbound US-63 from US-50 to Arkansas border
- Eastbound US-60 from Oklahoma border to US-65
- MO 13 from US-54 to US-65

In addition, small segments of US-67 and US-50 in St. Louis and US-71 and MO-210 in Kansas City are in Tier 1.

Figure A-33: Crash Rates on Interstates in Missouri

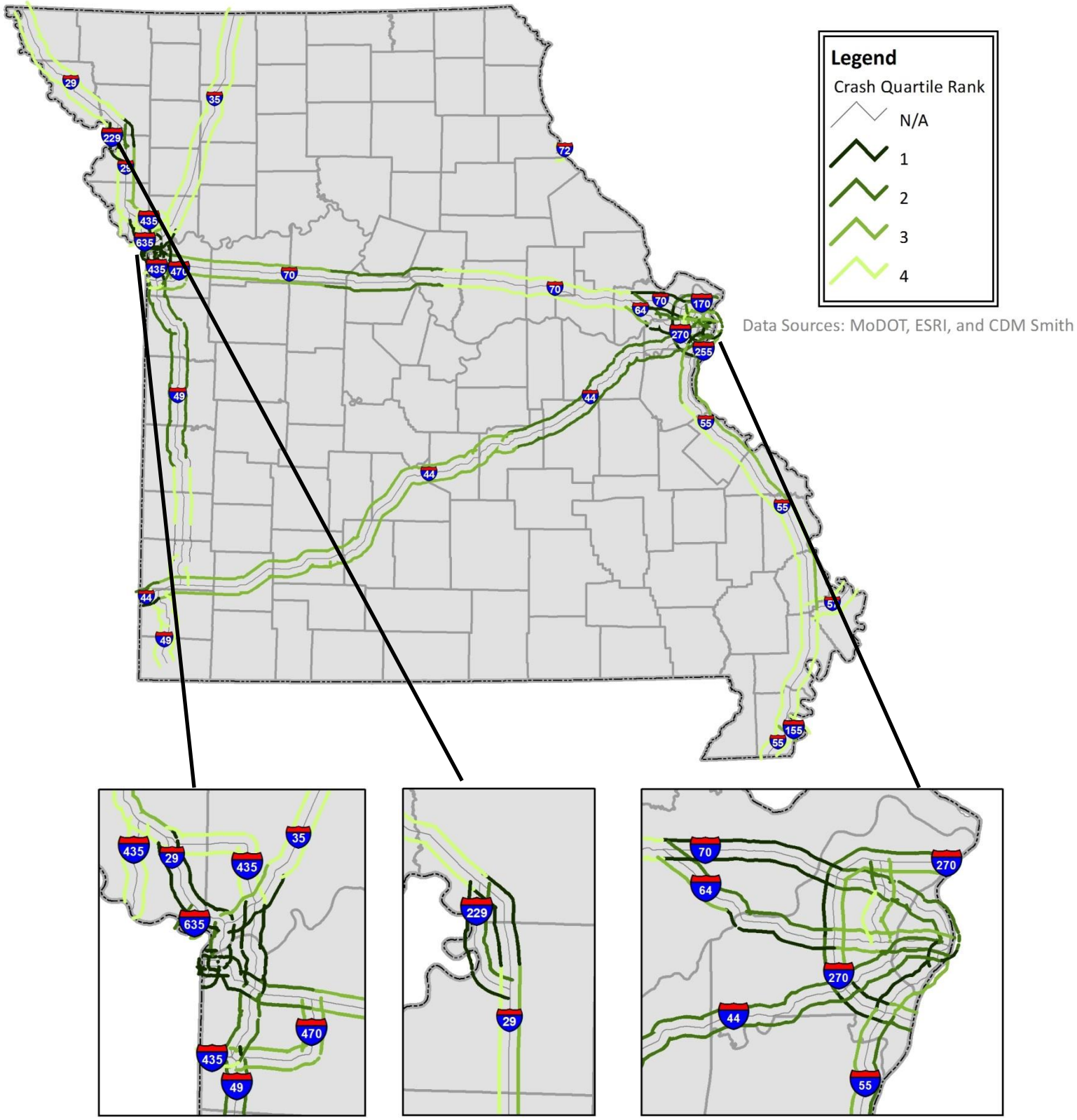
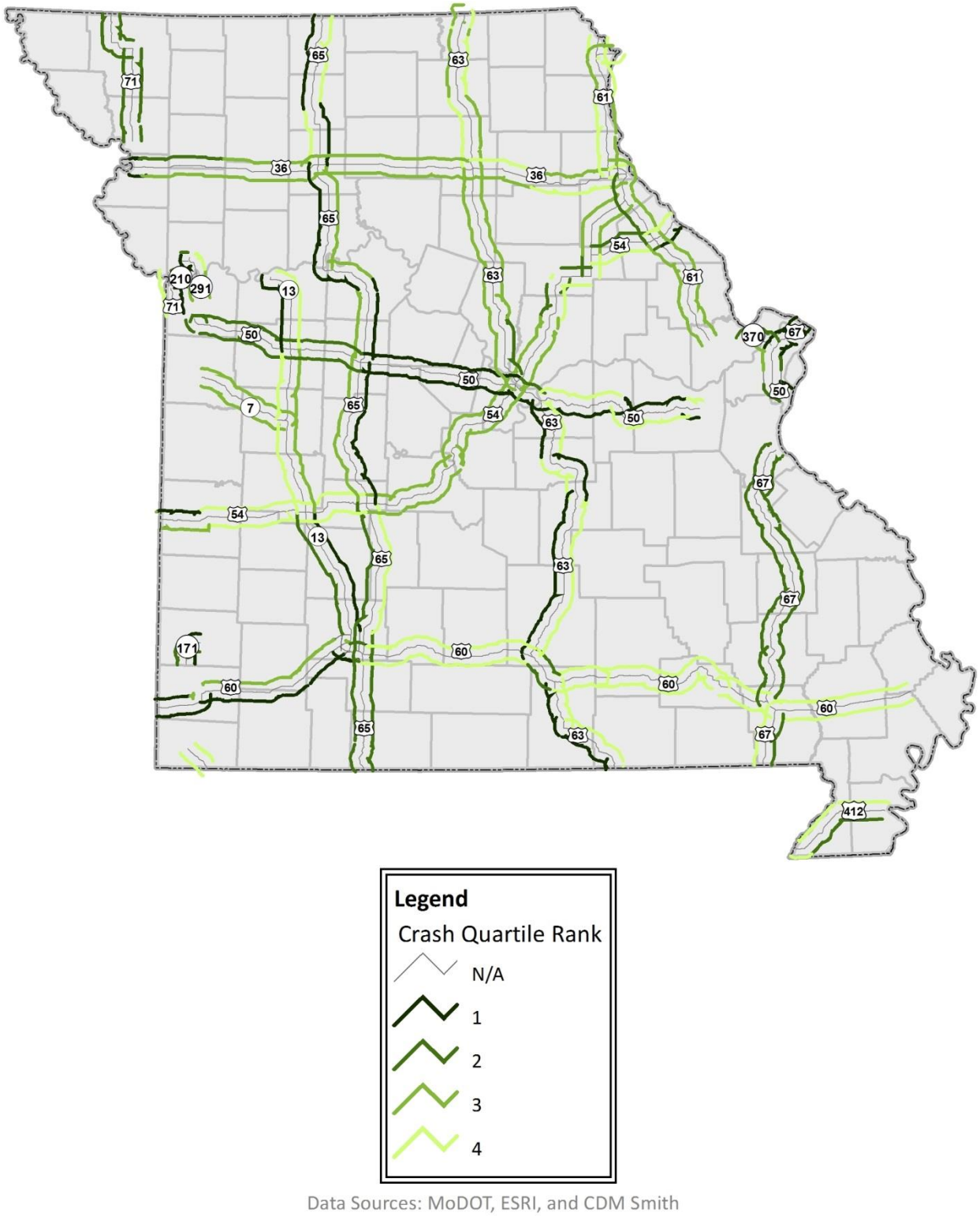


Figure A-34: Crash Rates on U.S. Highways and Missouri Routes



Data Sources: MoDOT, ESRI, and CDM Smith

Freight Flows and Forecasts

This section discusses the existing Missouri freight and commodity flows, as well as the forecasted 2030 flows. The commodity flows are discussed by mode of transportation.

A vast amount of freight traverses Missouri's infrastructure annually. Such freight includes finished goods, materials, and supplies. Central issues concerning freight are: identifying the movements most important to Missouri, and identifying options to facilitate/support them. Identifying the importance of, and solutions for, freight issues comprises several perspectives: volumes (especially compared to capacity), values, related economic impacts, and public perception. TRANSEARCH® data provides Missouri-related movements by mode, direction, and commodity, and by tonnage, units, and value. The full TRANSEARCH report is located in Attachment D.

Freight tonnage across the Missouri freight network is forecast to grow 37.3 percent from 2011 to 2030 (1.7 percent annually), as summarized in **Table A-25**. Truck and rail are by far the dominant modes of freight transportation in Missouri. Truck movements account for 49 percent of the total tonnage and rail movements account for 45 percent. Truck growth is forecast to grow by 55.5 percent (2.4 percent annually), from 500.4 million tons in 2011 to 778.1 million in 2030, a 277.7 million ton increase. In the context of the aggregate 378.8 million ton growth forecast for all combined modes, this 277.7 million increase in truck constitutes 73.3 percent, about half of which is attributable to through movements. While rail growth is forecast to grow by 19 percent (0.9 percent annually), from 458.1 million tons in 2011 to 545.2 million tons in 2030, it still constitutes 40 percent of the total tonnage moved through Missouri.

Through movements are the dominant direction of freight movement in Missouri. They represent 59 percent of all tonnage and are forecast to exhibit the largest percentage growth (73.0 percent, or 2.9 percent annually). This is a significant increase and in perspective, through traffic is projected to increase in absolute tonnage terms (204.8 million) in excess of all the three other directions combined (174.0 million).

Table 25: Tonnage Forecast by Mode and Direction, 2011 to 2030

Direction	Air	Pipe	Rail	Truck	Water	Total
2011						
Outbound	34,313	N/A	21,510,433	75,301,621	19,973,291	116,819,658
Inbound	38,249	932,258	92,326,793	89,250,507	5,093,847	187,641,654
Intra	370	N/A	2,436,087	105,627,915	4,941,503	113,005,875
Through	71	7,412,827	341,805,597	230,212,488	19,850,043	599,281,026
Total	**73,003**	**8,345,085**	**458,078,910**	**500,392,531**	**49,858,684**	**1,016,748,213**
2030						
Outbound	54,382	N/A	35,366,325	108,430,027	25,917,689	169,768,423
Inbound	84,077	993,713	90,178,404	129,095,659	5,906,771	226,258,624
Intra	726	N/A	3,237,194	182,656,763	9,565,245	195,459,929
Through	112	7,896,550	416,384,127	357,953,967	21,865,151	804,099,907
Total	**139,296**	**8,890,264**	**545,166,049**	**778,136,417**	**63,254,857**	**1,395,586,882**
Annual % Growth						
Outbound	2.5%	N/A	2.7%	1.9%	1.4%	2.0%
Inbound	4.2%	0.3%	-0.1%	2.0%	0.8%	1.0%
Intra	3.6%	N/A	1.5%	2.9%	3.5%	2.9%
Through	2.4%	0.3%	1.0%	2.4%	0.5%	1.6%
Total	**3.5%**	**0.3%**	**0.9%**	**2.4%**	**1.3%**	**1.7%**
Total % Growth						
Outbound	58.5%	N/A	64.4%	44.0%	29.8%	45.3%
Inbound	119.8%	6.6%	-2.3%	44.6%	16.0%	20.6%
Intra	96.2%	N/A	32.9%	72.9%	93.6%	73.0%
Through	56.8%	6.5%	21.8%	55.5%	10.2%	34.2%
Total	**90.8%**	**6.5%**	**19.0%**	**55.5%**	**26.9%**	**37.3%**
Tonnage Growth						
Outbound	20,068	N/A	13,855,892	33,128,407	5,944,398	52,948,764
Inbound	45,828	61,455	(2,148,389)	39,845,152	812,925	38,616,971
Intra	356	N/A	801,107	77,028,848	4,623,743	82,454,054
Through	40	483,724	74,578,530	127,741,479	2,015,108	204,818,881
Total	**66,293**	**545,179**	**87,087,139**	**277,743,886**	**13,396,173**	**378,838,670**

Source: TRANSEARCH Data, 2011

Truck Commodity Flows

Missouri truck movements in 2011 totaled 500.4 million tons, were valued at $710.9 billion, and carried 40.6 million units (**Table A-26**). On average, total truck commodity movements are valued at $1,421 per ton. Truck movements represent 49.2 percent of modal tonnage in Missouri and 59.0 percent of total modal value in 2011, the largest relative share.

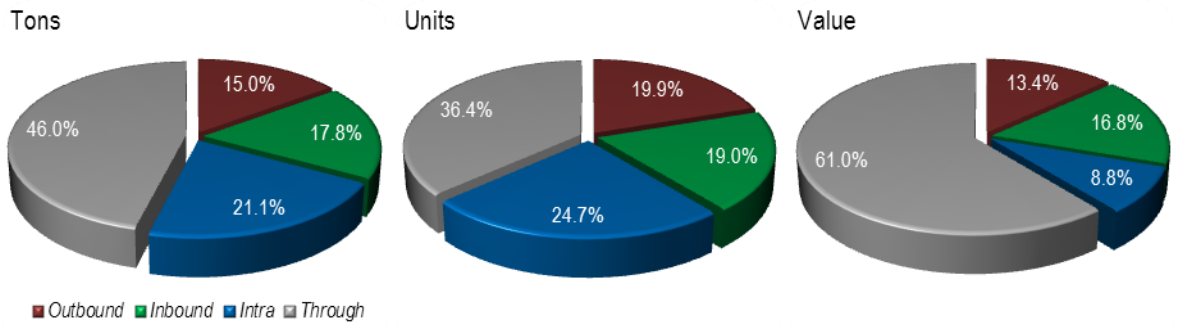
Table A-26: Truck by Direction, 2011

Direction	Tons		Units		Value (in millions)		Average
	Amount	Percent	Amount	Percent	Amount	Percent	Value/Ton
Outbound	75,301,621	15.0%	8,088,079	19.9%	$95,005	13.4%	$1,262
Inbound	89,250,507	17.8%	7,725,094	19.0%	$119,731	16.8%	$1,342
Intra	105,627,915	21.1%	10,029,099	24.7%	$62,346	8.8%	$590
Through	230,212,488	46.0%	14,805,680	36.4%	$433,794	61.0%	$1,884
Total	500,392,531	100.0%	40,647,951	100.0%	$710,876	100.0%	$1,421

Source: TRANSEARCH Data, 2011

As depicted in **Figure A-35**, through truck movements are the largest directional movements, comprising 46.0% of total tonnage, 36.4% of units, and 61.0% of value. Outbound, inbound, and intrastate movements comprise a remaining 270.2 million tons (54.0%), valued at $277.1 billion (39.0%).

Figure A-35: Truck Percentages by Direction, 2011



Source: TRANSEARCH Data, 2011

The major truck freight corridors include the major interstates (I-44, I-55, I-70, I-35, and I-29), as seen in **Figure A-36**. Additionally, major U.S. and State highways in the urban centers also accommodate significant freight movements (e.g., US-61 and US-71). The top truck commodity movements by direction are identified in the respective subsections. In terms of all truck directions combined, **Table A-27** shows the top five commodities:

Table A-27: Top Truck Commodities

Commodity by Tonnage	Tons (in millions)	Percent
Non-Metallic Materials	102.4	20.5%
Secondary Traffic	84.0	16.8%
Farm Products	82.2	16.4%
Food or Kindred Products	57.5	11.5%
Chemicals or Allied Products	41.8	8.4%
Commodity by Units	**Units (in millions)**	**Percent**
Shipping Containers	15.7	38.6%
Farm Products	4.9	12.1%
Secondary Traffic	4.4	10.9%
Nonmetallic Minerals	4.2	10.4%
Food or Kindred Products	2.5	6.2%
Commodity by Value	**Value (in billions)**	**Percent**
Secondary Traffic	$161.7	22.7%
Chemicals or Allied Products	$73.0	10.3%
Food or Kindred Products	$71.0	10.0%
Machinery	$53.2	7.5%
Transportation Equipment	$50.3	7.1%

Source: TRANSEARCH Data, 2011

Figure A-36: Truck Density, 2011

Truck Outbound

The outbound truck commodities from Missouri, in 2011, totaled 75.3 million tons (15.0% of directional movements), via 8.1 million units (19.9%), and were valued at $95.0 billion (13.4%), with an average value/ton of $1,262. The top five outbound truck commodities are shown in **Table A-28**:

Table A-28: Top Outbound Truck Commodities

Commodity by Tonnage	Tons (in millions)	Percent
Farm Products	17.9	23.8%
Non-Metallic Materials	14.4	19.1%
Secondary Traffic	11.3	14.9%
Food or Kindred Products	10.5	14.0%
Chemicals or Allied Products	3.3	4.4%
Commodity by Units	**Units (in millions)**	**Percent**
Shipping Containers	4.2	52.1%
Farm Products	1.1	13.6%
Secondary Traffic[23]	0.6	7.7%
Nonmetallic Minerals	0.6	7.3%
Food or Kindred Products	0.5	5.7%
Commodity by Value	**Value (in billions)**	**Percent**
Secondary Traffic	$23.1	24.3%
Food or Kindred Products	$14.2	14.9%
Farm Products	$9.2	9.7%
Chemicals or Allied Products	$9.2	9.6%
Machinery	$7.5	7.9%

Source: TRANSEARCH Data, 2011

[23] Traffic that is being delivered from a warehouse or distribution center.

Outbound Tonnage Origin

The major outbound truck tonnages in 2011 are shown by county origin below. Truck movements destined out-of-state are primarily traveling from Jackson County (7.3 million, 9.8%), St. Louis County (7.1 million, 9.4%), and St. Louis City (6.1 million, 8.1%).

Jackson County:

1. Secondary Traffic (3.4 million tons, 46.4% of outbound county total)
2. Food or Kindred Products (0.9 million, 12.1%)
3. Nonmetallic Minerals (0.6 million, 8.8%)

St. Louis County:

1. Nonmetallic Minerals (3.3 million tons, 46.7% of outbound county total)
2. Food or Kindred Products (0.8 million, 11.7%)
3. Secondary Traffic (0.8 million, 10.9%)

St. Louis City:

1. Secondary Traffic (3.3 million tons, 54.9% of outbound county total)
2. Food or Kindred Products (1.0 million, 16.3%)
3. Waste or Scrap Materials (0.6 million, 9.4%)

Outbound Tonnage Destination

The major outbound truck tonnages in 2011 are shown by state. Truck movements destined out-of-state are primarily traveling to Illinois (18.1 million, 24.0%), Kansas (12.7 million, 16.8%), and Arkansas (7.2 million, 9.6%).

Illinois:

1. Nonmetallic Minerals(7.1 million tons, 39.3% of outbound state total)
2. Farm Products (5.1 million, 28.0%)
3. Secondary Traffic (1.8 million, 9.7%)

Kansas:

1. Nonmetallic Minerals (3.9 million tons, 31.0% of outbound state total)
2. Secondary Traffic (2.1 million, 16.8%)
3. Farm Products (1.7 million, 13.5%)

Arkansas:

1. Nonmetallic Minerals (2.5 million tons, 34.6% of outbound state total)
2. Farm Products (1.8 million, 24.7%)
3. Food or Kindred Products (1.0 million, 14.3%)

Truck Inbound

The inbound truck commodities to Missouri in 2011 totaled 89.3 million tons (17.8% of directional movements), via 7.7 million units (19.0%), and were valued at $119.7 billion (16.8%), with an average value/ton of $1,342 . The top five inbound truck commodities are shown in **Table A-29**.

Table A-29: Top Inbound Truck Commodities

Commodity by Tonnage	Tons (in millions)	Percent
Farm Products	20.1	22.6%
Secondary Traffic	14.6	16.4%
Non-Metallic Materials	13.8	15.4%
Petroleum or Coal Products	10.6	11.9%
Food or Kindred Products	8.3	9.3%
Commodity by Units	**Units (in millions)**	**Percent**
Shipping Containers	3.2	41.2%
Farm Products	1.2	16.0%
Secondary Traffic	0.8	9.8%
Nonmetallic Minerals	0.6	7.3%
Petroleum or Coal Products	0.4	5.7%
Commodity by Value	**Value (in billions)**	**Percent**
Secondary Traffic	$27.9	23.3%
Farm Products	$11.7	9.8%
Petroleum or Coal Products	$10.9	9.1%
Food or Kindred Products	$10.0	8.4%
Transportation Equipment	$9.9	8.3%

Source: TRANSEARCH Data, 2011

Inbound Tonnage Origin

The major inbound truck tonnages in 2011 are shown by state origin below. Truck movements originating out-of-state are primarily traveling from Illinois (22.1 million, 24.7%), Kansas (17.4 million, 19.5%), and Iowa (7.9 million, 8.8%).

Illinois:

1. Nonmetallic Minerals (6.8 million tons, 30.7% of inbound state total)
2. Petroleum or Coal Products (3.9 million, 17.5%)
3. Farm Products (3.8 million, 17.4%)

Kansas:

1. Petroleum or Coal Products (4.6 million tons, 26.4% of inbound state total)
2. Nonmetallic Minerals (4.3 million, 24.6%)
3. Secondary Traffic (3.8 million, 21.6%)

Iowa:

1. Farm Products (4.3 million tons, 55.1% of inbound state total)
2. Nonmetallic Minerals (1.1 million, 14.2%)
3. Food or Kindred Products (0.8 million, 9.6%)

Inbound Tonnage Destination

The major inbound truck tonnages in 2011 are shown by county destination below. Truck movements originating out-of-state are primarily traveling to Jackson County (13.0 million, 14.6%), St. Louis County (11.4 million, 12.8%), and St. Louis City (9.7 million, 10.9%).

Jackson County:

1. Petroleum or Coal Products (3.2 million tons, 24.9% of inbound county total)
2. Secondary Traffic (2.9 million, 22.3%)
3. Nonmetallic Minerals (2.2 million, 16.9%)

St. Louis County:

1. Secondary Traffic (2.4 million tons, 21.2% of inbound county total)
2. Nonmetallic Minerals (1.8 million, 16.0%)
3. Petroleum or Coal Products (1.5 million, 12.7%)

St. Louis City:

1. Secondary Traffic (2.1 million tons, 21.8% of inbound county total)
2. Petroleum or Coal Products (2.0 million, 21.0%)
3. Farm Products (1.9 million, 19.8%)

Truck Intrastate

The intrastate truck commodities within Missouri in 2011 totaled 105.6 million tons (21.1% of directional movements), via 10.0 million units (24.7%), and were valued at $62.3 billion (8.8%), with an average value/ton of $590. **Table A-30** identifies the top five intrastate truck commodities within Missouri.

Table A-30: Top Truck Commodities Within Missouri

Commodity by Tonnage	Tons (in millions)	Percent
Non-Metallic Materials	65.5	62.0%
Secondary Traffic	14.7	13.9%
Farm Products	11.5	10.8%
Clay, Concrete, Glass or Stone	4.4	4.2%
Waste or Scrap Materials	2.3	2.2%
Commodity by Units	**Units (in millions)**	**Percent**
Shipping Containers	5.2	51.5%
Non-Metallic Materials	2.7	26.9%
Secondary Traffic	0.9	8.7%
Farm Products	0.6	5.9%
Clay, Concrete, Glass or Stone	0.3	2.8%
Commodity by Value	**Value (in billions)**	**Percent**
Secondary Traffic	$42.2	67.6%
Farm Products	$7.6	12.2%
Food or Kindred Products	$3.1	5.0%
Chemicals or Allied Products	$2.1	3.4%
Petroleum or Coal Products	$1.0	1.6%

Source: TRANSEARCH Data, 2011

Truck Through

The through truck commodities moving across Missouri in 2011 totaled 230.2 million tons (46.0% of directional movements), via 14.8 million units (36.4%), and were valued at $433.8 billion (61.0%), with an average value/ton of $1,884. **Table A-31** displays the top five through truck commodities.

Table A-31: Top Through Truck Commodities

Commodity by Tonnage	Tons (in millions)	Percent
Secondary Traffic	43.4	18.8%
Food or Kindred Products	36.5	15.9%
Chemicals or Allied Products	34.6	15.0%
Farm Products	32.7	14.2%
Petroleum or Coal Products	20.4	8.8%
Commodity by Units	**Units (in millions)**	**Percent**
Shipping Containers	3.1	21.0%
Secondary Traffic	2.2	14.8%
Farm Products	2.0	13.4%
Chemicals or Allied Products	1.7	11.5%
Food or Kindred Products	1.6	10.8%
Commodity by Value	**Value (in billions)**	**Percent**
Secondary Traffic	$68.5	15.8%
Chemicals or Allied Products	$55.1	12.7%
Food or Kindred Products	$43.7	10.1%
Machinery	$39.1	9.0%
Electrical Equipment	$37.9	8.7%

Source: TRANSEARCH Data, 2011

Rail Commodity Flows

Missouri rail movements in 2011 totaled 458.1 million tons, were valued at $465.0 billion, and carried 8.2 million units (**Table A-32**). On average, total rail commodity movements are valued at $1,015/ton. Rail movements represent 45.1% of modal tonnage in Missouri and 38.6% of total modal value in 2011, the second largest relative share.

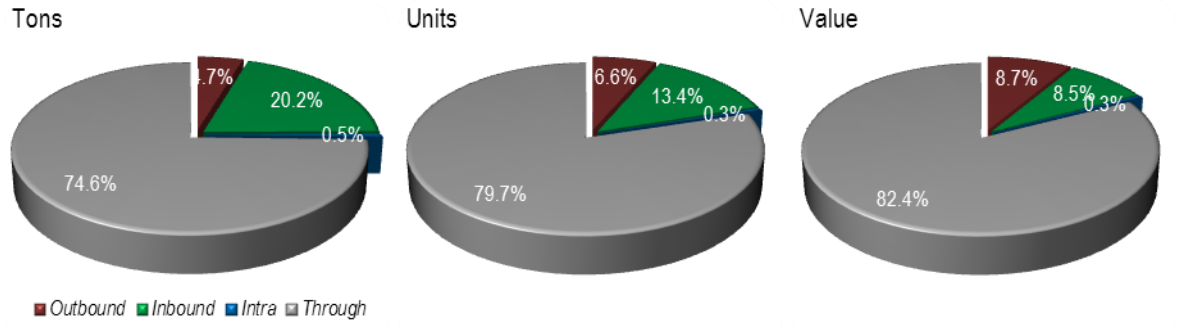
Table A-32: Rail by Direction, 2011

Direction	Tons		Units		Value (in millions)		Average
	Amount	Percent	Amount	Percent	Amount	Percent	Value/Ton
Outbound	21,510,433	4.7%	539,145	6.6%	$40,364	8.7%	$1,876
Inbound	92,326,793	20.2%	1,100,284	13.4%	$39,647	8.5%	$429
Intra	2,436,087	0.5%	25,780	0.3%	$1,616	0.3%	$663
Through	341,805,597	74.6%	6,554,377	79.7%	$383,409	82.4%	$1,122
Total	458,078,910	100.0%	8,219,586	100.0%	$465,035	100.0%	$1,015

Source: TRANSEARCH Data, 2011

As depicted in **Figure A-37**, through rail movements dominate directional movements: 74.6% of total tonnage, 79.7% of units, and 82.4% of value. Outbound, inbound, and intrastate movements, combined, comprise the remaining 25.4% of tons and 17.6% of value.

Figure A-37: Rail Percentages by Direction, 2011



Source: TRANSEARCH Data, 2011

Major rail freight corridors include routes served by the major Class 1 carriers, especially surrounding Kansas City, as seen in **Figure A-38**; routes with the densest rail traffic include the Union Pacific line between Kansas City and St. Louis and the Burlington Northern-Santa Fe lines connecting Kansas City and Chicago, and between Kansas City and Wyoming (via Nebraska). The top rail commodity movements by direction are identified in the respective subsections. **Table A-33** lists the top five commodities for rail for all directions.

Table A-33: Top Rail Commodities

Commodity by Tonnage	Tons (in millions)	Percent
Coal	223.9	48.9%
Food or Kindred Products	39.3	8.6%
Chemicals or Allied Products	38.2	8.3%
Miscellaneous Mixed Shipments	37.2	8.1%
Farm Products	36.2	7.9%
Commodity by Units	**Units (in millions)**	**Percent**
Miscellaneous Mixed Shipments	2.6	31.9%
Coal	1.9	22.9%
Transportation Equipment	0.7	8.4%
Food or Kindred Products	0.6	6.9%
Farm Products	0.5	6.0%
Commodity by Value	**Value (in billions)**	**Percent**
Miscellaneous Mixed Shipments	$186.9	40.2%
Transportation Equipment	$111.1	23.9%
Chemicals or Allied Products	$56.9	12.2%
Food or Kindred Products	$28.3	6.1%
Primary Metal Products	$18.2	3.9%

Source: TRANSEARCH Data, 2011

Figure A-38: Rail Density, 2011

Rail Outbound

The outbound rail commodities from Missouri in 2011 totaled 21.5 million tons (4.7% of directional movements), via 539,145 units (6.6%), and were valued at $40.4 billion (8.7%), with an average value/ton of $1,876. **Table A-34** shows the top five outbound rail commodities from Missouri.

Table A-34: Top Outbound Rail Commodities

Commodity by Tonnage	Tons (in millions)	Percent
Food or Kindred Products	5.0	23.2%
Clay, Concrete, Glass or Stone	3.1	14.6%
Farm Products	3.1	14.2%
Miscellaneous Mixed Shipments	2.3	10.5%
Waste of Scrap Materials	2.1	9.7%
Commodity by Units	**Units (in 1,000s)**	**Percent**
Miscellaneous Mixed Shipments	173.8	32.2%
Transportation Equipment	115.2	21.4%
Food or Kindred Products	70.9	13.1%
Clay, Concrete, Glass or Stone	32.6	6.0%
Farm Products	29.8	5.5%
Commodity by Value	**Value (in billions)**	**Percent**
Transportation Equipment	$19.4	47.9%
Miscellaneous Mixed Shipments	$11.2	27.7%
Chemicals or Allied Products	$3.1	7.6%
Food or Kindred Products	$2.8	6.9%
Primary Metal Products	$0.7	1.8%

Source: TRANSEARCH Data, 2011

Outbound Tonnage Origin

The major outbound rail tonnages in 2011 are shown by county origin below. Rail movements destined out-of-state are primarily traveling from Jackson County (10.2 million, 47.3%), St. Louis City (3.0 million, 13.8%), and Ste. Genevieve County (1.5 million, 6.8%).

Jackson County:

1. Food or Kindred Products (3.2 million tons, 31.3% of outbound county total)
2. Miscellaneous Mixed Shipments (1.7 million, 16.7%)
3. Transportation Equipment (1.3 million, 13.2%)

St. Louis City:

1. Waste or Scrap Materials (0.9 million tons, 28.8% of outbound county total)
2. Chemicals or Allied Products (0.7 million, 22.7%)

3. Miscellaneous Mixed Shipments (0.6 million, 19.0%)

Ste. Genevieve County:

1. Clay, Concrete, Glass, or Stone (1.5 million tons, 99.2% of outbound county total)
2. Chemicals or Allied Products (6,320, 0.4%)
3. Transportation Equipment (5,520, 0.4%)

Outbound Tonnage Destination

The major outbound rail tonnages in 2011 are shown by state destination below. Rail movements destined out-of-state are primarily traveling to Texas (3.9 million, 18.1%), California (2.0 million, 9.3%), and Illinois (1.4 million, 6.7%).

Texas:

1. Food or Kindred Products (1.8 million tons, 45.3% of outbound state total)
2. Farm Products (0.7 million, 18.1%)
3. Clay, Concrete, Glass, or Stone (0.6 million, 14.8%)

California:

1. Miscellaneous Mixed Shipments (0.7 million tons, 35.7% of outbound state total)
2. Transportation Equipment (0.4 million, 18.7%)
3. Food and Kindred Products (0.3 million, 13.8%)

Illinois:

1. Transportation Equipment (0.3 million tons, 21.3% of outbound state total)
2. Chemicals or Allied Products (0.3 million, 18.1%)
3. Nonmetallic Minerals (0.2 million, 15.1%)

Rail Inbound

The inbound rail commodities to Missouri in 2011 totaled 92.3 million tons (20.2% of directional movements), via 1.1 million units (13.4%), and were valued at $39.6 billion (8.5%), with an average value/ton of $429. The top five inbound rail commodities are shown in **Table A-35**.

Table A-35: Top Inbound Rail Commodities

Commodity by Tonnage	Tons (in millions)	Percent
Coal	74.0	80.2%
Food or Kindred Products	4.0	4.4%
Farm Products	2.9	3.2%
Chemicals or Allied Products	2.9	3.1%
Transportation Equipment	1.9	2.1%
Commodity by Units	**Units (in 1,000s)**	**Percent**
Coal	619.9	56.3%
Miscellaneous Mixed Shipments	150.3	13.7%
Transportation Equipment	103.7	9.4%
Food or Kindred Products	46.1	4.2%
Shipping Containers	35.9	3.3%
Commodity by Value	**Value (in billions)**	**Percent**
Transportation Equipment	$16.0	40.4%
Miscellaneous Mixed Shipments	$9.2	23.2%
Chemicals or Allied Products	$3.6	9.0%
Coal	$2.7	6.8%
Primary Metal Products	$2.2	5.6%

Source: TRANSEARCH Data, 2011

Inbound Tonnage Origin

The major inbound rail tonnages in 2011 are shown by state origin below. Rail movements originating out-of-state are primarily traveling from Wyoming (74.3 million, 80.5%), Illinois (2.0 million, 2.1%), and North Dakota (1.3 million, 1.4%).

Wyoming:

1. Coal (73.7 million tons, 99.2% of inbound state total)
2. Chemicals or Allied Products (0.4 million, 0.6%)
3. Clay, Concrete, Glass, or Stone (0.2 million, 0.2%)

Illinois:

1. Food or Kindred Products (0.9 million tons, 46.9% of inbound state total)
2. Transportation Equipment (0.2 million, 11.9%)
3. Chemicals or Allied Products (0.2 million, 11.9%)

North Dakota:

1. Farm Products (1.0 million tons, 73.4% of inbound state total)
2. Food or Kindred Products (0.3 million, 24.4%)

3. Chemicals or Allied Products (29,200, 2.2%)

Inbound Tonnage Destination

The major inbound rail tonnages in 2011 are shown by county destination below. Rail movements originating out-of-state are primarily traveling to Jackson County (28.4 million, 30.7%), St. Louis City (11.8 million, 12.8%), and Franklin County (11.7 million, 12.6%).

Jackson County:

1. Coal (19.3 million tons, 68.0% of inbound county total)
2. Food or Kindred Products (2.7 million, 9.4%)
3. Miscellaneous Mixed Shipments (1.4 million, 4.8%)

St. Louis City:

1. Coal (7.6 million tons, 64.4% of inbound county total)
2. Farm Products (1.5 million, 12.7%)
3. Chemicals or Allied Products (1.0 million, 8.6%)

Franklin County:

1. Coal (11.6 million tons, 99.8% of inbound county total)
2. Chemicals or Allied Products (7,840, 0.1%)
3. Pulp, Paper, or Allied Products (6,020, 0.1%)

Rail Intrastate

The intrastate rail commodities within Missouri in 2011 totaled 2.4 million tons (0.5% of directional movements), via 25,780 units (0.3%), and were valued at $1.6 billion (0.3%), with an average value/ton of $663. **Table A-36** shows the top five intrastate rail commodities within Missouri.

Table A-36: Top Rail Commodities Within Missouri

Commodity by Tonnage	Tons (in millions)	Percent
Coal	1.2	50.2%
Clay, Concrete, Glass or Stone	0.5	21.1%
Farm Products	0.2	7.3%
Nonmetallic Minerals	0.2	7.3%
Food or Kindred Products	0.1	5.4%
Commodity by Units	**Units (in 1,000s)**	**Percent**
Coal	10.5	40.6%
Clay, Concrete, Glass or Stone	5.2	20.0%
Transportation Equipment	3.1	12.0%
Nonmetallic Minerals	2.2	8.5%
Farm Products	1.7	6.6%
Commodity by Value	**Value (in millions)**	**Percent**
Transportation Equipment	$1,125	69.6%
Chemicals or Allied Products	$192	11.9%
Clay, Concrete, Glass or Stone	$86	5.4%
Food or Kindred Products	$80	4.9%
Coal	$45	2.8%

Source: TRANSEARCH Data, 2011

Rail Through

The through rail commodities moving across Missouri in 2011 totaled 341.8 million tons (74.6 percent of directional movements), via 6.6 million units (79.7 percent), and were valued at $383.4 billion (82.4 percent), with an average value/ton of $1,122. The top five through rail commodities are shown in **Table A-37**.

Table A-37: Top Through Rail Commodities

Commodity by Tonnage	Tons (in millions)	Percent
Coal	148.7	43.5%
Chemicals or Allied Products	33.3	9.7%
Miscellaneous Mixed Products	33.1	9.7%
Food or Kindred Products	30.1	8.8%
Farm Products	30.0	8.8%
Commodity by Units	**Units (in millions)**	**Percent**
Miscellaneous Mixed Products	2.3	35.0%
Coal	1.3	19.1%
Transportation Equipment	0.5	7.2%
Food or Kindred Products	0.4	6.8%
Farm Products	0.4	6.5%
Commodity by Value	**Value (in billions)**	**Percent**
Miscellaneous Mixed Products	$166.6	43.5%
Transportation Equipment	$74.6	19.5%
Chemicals or Allied Products	$50.1	13.1%
Food or Kindred Products	$23.3	6.1%
Primary Metal Products	$15.2	4.0%

Source: TRANSEARCH Data, 2011

Waterway and Ports Commodity Flows

Missouri public port (waterborne) movements in 2011 totaled 49.9 million tons and were valued at $12.5 billion (**Table A-38**). On average, total port commodity movements are valued at $252/ton. Port movements represent 4.9 percent or modal tonnage in Missouri and 1.0% of total modal value in 2011, a small proportion relative to the dominant truck and rail modes. This data is reported through the public port authorities only and does not capture commodity flow from the numerous private ports in the State.

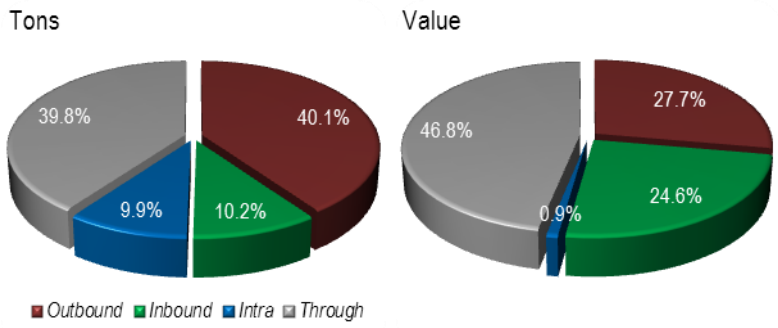
Table A-38: Port by Direction, 2011

Direction	Tons		Value (in millions)		Average Value/Ton
	Amount	Percent	Amount	Percent	
Outbound	19,973,291	40.1%	$3,479	27.7%	$174
Inbound	5,093,847	10.2%	$3,083	24.6%	$605
Intra	4,941,503	9.9%	$117	0.9%	$24
Through	19,850,043	39.8%	$5,870	46.8%	$296
Total	49,858,684	100.0%	$12,549	100.0%	$252

Source: TRANSEARCH Data, 2011

As depicted in **Figure A-39**, outbound and through tonnage directions constitute the majority of (and proportionally similar) directional movements: 40.1 percent and 39.8 percent, respectively, of total port tonnage. However, in terms of value, the through-based traffic is the relatively largest share, with outbound value not constituting similar percentages relating to tonnage because of the smaller value/ton metric for outbound port movements relative to through port movements. Intrastate port movements are relatively insignificant, but inbound comprises about a quarter of all value, despite a small tonnage percentage (due to relative high value/ton). Unlike truck and rail, unit information was not available for the ports.

Figure A-39: Port Percentages by Direction, 2011



Source: TRANSEARCH Data, 2011

Table A-39 identifies the top five port commodities for all port directions combined.

Table A-39: Top Port Commodities

Commodity by Tonnage	Tons (in millions)	Percent
Coal	12.6	25.3%
Farm Products	10.8	21.7%
Nonmetallic Minerals	8.8	17.6%
Chemicals or Allied Products	4.6	9.2%
Clay, Concrete, Glass or Stone	4.3	8.6%
Commodity by Value	**Value (in billions)**	**Percent**
Chemicals or Allied Products	$3.5	27.8%
Petroleum or Coal Products	$3.0	24.2%
Farm Products	$2.1	17.1%
Crude Petroleum of Natural Gas	$0.7	5.6%
Food or Kindred Products	$0.6	4.5%

Source: TRANSEARCH Data, 2011

Port Outbound

The outbound port commodities from Missouri in 2011 totaled 20.0 million tons (40.1% of directional movements), were valued at $3.5 billion (27.7%), and had an average value/ton of $174. The top five outbound port commodities are included in **Table A-40**.

Table A-40: Top Outbound Port Commodities

Commodity by Tonnage	Tons (in millions)	Percent
Coal	6.9	34.7%
Farm Products	4.9	24.6%
Clay, Concrete, Glass or Stone	3.4	16.8%
Nonmetallic Minerals	2.5	12.7%
Chemicals or Allied Products	0.9	4.3%
Commodity by Value	**Value (in millions)**	**Percent**
Chemicals or Allied Products	$976	28.1%
Farm Products	$960	27.6%
Clay, Concrete, Glass or Stone	$458	13.2%
Metallic Ores	$446	12.8%
Coal	$253	7.3%

Source: TRANSEARCH Data, 2011

Port Inbound

The inbound port commodities to Missouri in 2011 totaled 5.1 million tons (10.2% of directional movements), and were valued at $3.1 billion (24.6%), with an average value/ton of $605. **Table A-41** shows the top five inbound port commodities to Missouri

Table A-41: Top Inbound Port Commodities

Commodity by Tonnage	Tons (in millions)	Percent
Chemicals or Allied Products	1.7	33.6%
Petroleum or Coal Products	1.7	32.7%
Nonmetallic Minerals	0.7	13.3%
Metallic Ores	0.5	10.3%
Farm Products	0.2	4.3%
Commodity by Value	**Value (in millions)**	**Percent**
Petroleum or Coal Products	$1,531	49.7%
Chemicals or Allied Products	$1,192	35.4%
Primary Metal Products	$164	5.3%
Fabricated Metal Products	$105	3.4%
Machinery	$60	2.0%

Source: TRANSEARCH Data, 2011

Port Intrastate

The intrastate port commodities within Missouri in 2011 totaled 4.9 million tons (9.9% of directional movements), were valued at $117 million (0.9%), and had an average value/ton of $24. The top five instrastate port commodities are displayed in **Table A-42**.

Table A-42: Top Port Commodities Within Missouri

Commodity by Tonnage	Tons (in 1,000s)	Percent
Nonmetallic Minerals	4,261.7	86.2%
Clay, Concrete, Glass or Stone	606.9	12.3%
Chemicals or Allied Products	34.1	0.7%
Petroleum or Coal Products	18.8	0.4%
Farm Products	17.8	0.4%
Commodity by Value	**Value (in millions)**	**Percent**
Clay, Concrete, Glass or Stone	$59	50.0%
Nonmetallic Minerals	$33	28.4%
Chemicals or Allied Products	$16	13.9%
Farm Products	$5	4.2%
Primary Metal Products	$2	2.0%

Source: TRANSEARCH Data, 2011

Port Through

The through port commodities moving across Missouri in 2011 totaled 19.9 million tons (39.8% of directional movements), were valued at $5.9 billion (46.8%), and had an average value/ton of $296. **Table A-43** shows the top five through port commodities moving across Missouri.

Table A-43: Top Through Port Commodities

Commodity by Tonnage	Tons (in millions)	Percent
Coal	5.7	28.7%
Farm Products	5.7	28.7%
Petroleum or Coal Products	2.4	12.0%
Chemicals or Allied Products	2.0	10.1%
Nonmetallic Minerals	1.3	6.4%
Commodity by Value	**Value (in billions)**	**Percent**
Petroleum or Coal Products	$1.5	25.3%
Chemicals or Allied Products	$1.4	23.8%
Farm Products	$1.1	19.0%
Crude Petroleum or Natural Gas	$0.6	10.8%

Food or Kindred Products	**$0.4**	**6.9%**

Source: TRANSEARCH Data, 2011

Air Commodity Flows

Missouri air movements in 2011 totaled 73,003 tons, and were valued at $11.4 billion (**Table A-44**). On average, total port commodity movements are valued at $155,974/ton. Air movements represent less than 0.01% of modal tonnage in Missouri and less than 1.0% of total modal value in 2011, a very small proportion relative to other modes.

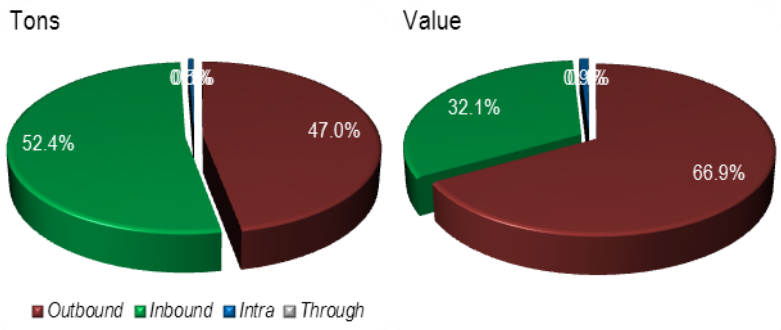
Table A-44: Air by Direction, 2011

Direction	Tons		Value (in millions)		Average
	Amount	Percent	Amount	Percent	Value/Ton
Outbound	34,313	47.0%	$7,620	66.9%	$222,085
Inbound	38,249	52.4%	$3,656	32.1%	$95,591
Intra	370	0.5%	$100	0.9%	$270,224
Through	71	0.1%	$10	0.1%	$139,152
Total	73,003	100.0%	$11,387	100.0%	$155,974

Source: TRANSEARCH Data, 2011

As depicted in **Figure A-40**, outbound and inbound tonnage directions constitute the gross majority (and proportionally similar) of directional movements: 47.0% and 52.4%, respectively, of total air tonnage. However, in terms of value, the outbound-based traffic is the relatively largest share, due to the relatively higher value/ton metric for outbound compared to inbound air movements (more than twice as expensive). Intrastate and through air movements are insignificant and effectively dismissible, given the combined total of only 441 tons, valued at $110 million (as such, commodity details for such modal directions are not delineated in subsections below). Like the ports, unit information was not available for air.

Figure A-40: Air Percentages by Direction, 2011



Source: TRANSEARCH Data, 2011

Table A-45 shows the top five air freight commodities.

Table A-45: Top Air Commodities

Commodity by Tonnage	Tons (in 1,000s)	Percent
Textile Mill Products	13.6	18.6%
Transportation Equipment	9.9	13.5%
Electrical Equipment	9.4	12.8%
Printed Matter	7.4	10.1%
Miscellaneous Manufacturing Products	6.7	9.1%
Commodity by Value	**Value (in billions)**	**Percent**
Miscellaneous Manufacturing Products	$4.1	35.8%
Transportation Equipment	$2.2	19.6%
Electrical Equipment	$2.1	18.3%
Chemicals or Allied Products	$1.1	9.5%
Instruments, Photo Equipment and Optical Equipment	$0.8	7.0%

Source: TRANSEARCH Data, 2011

Air Outbound

The outbound air commodities from Missouri in 2011 totaled 34,313 tons (47.0% of directional movements), and were valued at $7.6 billion (66.9%), with an average value/ton of $222,085. The top five outbound air commodities are included in **Table A-46**.

Table A-46: Top Outbound Air Commodities

Commodity by Tonnage	Tons (in 1,000s)	Percent
Transportation Equipment	8.0	23.4%
Miscellaneous Manufacturing Products	5.8	16.8%
Electrical Equipment	4.2	12.1%
Mail or Contract Traffic	2.8	8.1%
Textile Mill Products	2.3	6.7%
Commodity by Value	**Value (in billions)**	**Percent**
Miscellaneous Manufacturing Products	$3.5	46.3%
Transportation Equipment	$1.8	23.9%
Electrical Equipment	$0.9	12.1%
Chemicals or Allied Products	$0.6	7.8%
Instruments, Photo Equipment and Optical Equipment	$0.3	3.6%

Source: TRANSEARCH Data, 2011

Air Inbound

The inbound air commodities to Missouri in 2011 totaled 38,249 tons (52.4% of directional movements), and were valued at $3.7 billion (32.1%), with an average value/ton of $95,591. The top five inbound air commodities are included in **Table A-47**.

Table A-47: Top Inbound Air Commodities

Commodity by Tonnage	Tons (in 1,000s)	Percent
Textile Mill Products	11.3	29.5%
Printed Matter	5.8	15.1%
Electrical Equipment	4.9	12.8%
Mail or Contract Traffic	2.6	6.7%
Instruments, Photo Equipment and Optical Equipment	2.5	6.6%
Commodity by Value	**Value (in billions)**	**Percent**
Electrical Equipment	$1.1	30.0%
Instruments, Photo Equipment and Optical Equipment	$0.5	14.1%
Miscellaneous Manufacturing Products	$0.5	14.1%
Chemicals or Allied Products	$0.5	13.2%
Transportation Equipment	$0.4	11.2%

Source: TRANSEARCH Data, 2011

Pipeline Commodity Flows

Missouri pipeline movements in 2011 totaled 8.3 million tons, and were valued at $5.8 billion (**Table A-48**). On average, total pipeline commodity movements are valued at $690/ton. Pipeline movements represent less than 1.0% of modal tonnage in Missouri and 0.5% of total modal value in 2011: the second smallest relative volume and smallest value of the presented modes.

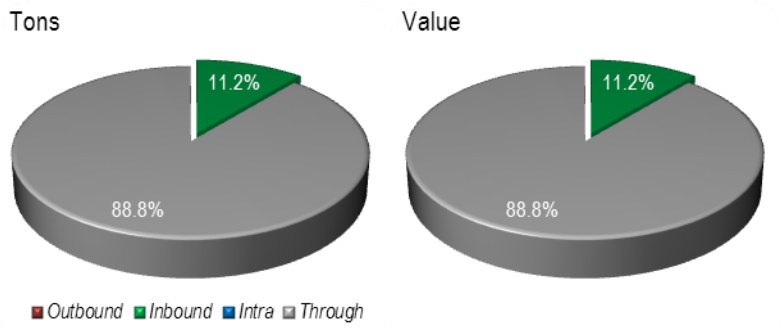
Table A-48: Pipeline by Direction, 2011

Direction	Tons		Value (in millions)		Average
	Amount	Percent	Amount	Percent	Value/Ton
Outbound	N/A	N/A	N/A	N/A	N/A
Inbound	932,258	11.2%	$643	11.2%	$690
Intra	N/A	N/A	N/A	N/A	N/A
Through	7,412,827	88.8%	$5,117	88.8%	$690
Total	8,345,085	100.0%	$5,761	100.0%	$690

Source: TRANSEARCH Data, 2011

As depicted in **Figure A-41,** only through and inbound tonnage directions exist for pipelines in Missouri, with through constituting the significant majority for both tonnage and value (88.8% of both terms).

Figure A-41: Pipeline Percentages by Direction, 2011



Source: TRANSEARCH Data, 2011

Missouri pipeline movements comprise only two Standard Transportation Commodity Classes (STCCs) (Crude Petroleum and Natural Gas, and Petroleum or Coal Products) and two directions (inbound and through). In effect, over 99.9% of all pipeline-related movements are in the STCC: Crude Petroleum and Natural Gas, with an insignificant fraction accounting for Petroleum or Coal Products as an inbound movement. As depicted above, most of the Crude Petroleum and Natural Gas (88.8%) simply flows through Missouri.

Conclusions and Next Steps

Missouri's freight system includes a wide variety of assets of varying modes, including highway, rail, air, water and pipeline as well as intermodal facilities and freight generators. The largest of these assets is Missouri's 33,700 miles of roadway. By identifying not only the critical nodes, links, and corridors of the State's freight system, but the system's current condition and performance this analysis will ultimately build the foundation for the assessment of needs of the current freight system.

Missouri is a bridge state; the TRANSEARCH® data confirms this assertion with data indicating that the majority of movements traversing Missouri's transportation network is truck- and rail-based through traffic. The main commodities are rail-based coal and truck-based secondary traffic. It is also projected that the dominance of through-based traffic will increase by 2030, reinforcing the role of Missouri as a bridge state. Of the modes, truck carries the largest relative volume and value followed by rail and then port. Pipeline carries the fourth largest relative volume followed by air; however, air carries the fourth largest by value followed by pipeline.

From a comprehensive tonnage and value perspective, the most important freight movements are through-based movements, carried by truck and rail. Thus it is important to understand the implications of these movements on the freight system in Missouri, as the users of the system are accordingly non-Missouri based. In effect, the freight system in Missouri is serving the necessary needs of others, and Missouri should keep in mind.

The ensuing economic analysis builds upon the freight data presented herein to explain and quantify the importance of freight transport to the Missouri economy. Economic impacts associated with freight go far beyond the impacts associated with freight transport service. A vast majority of freight-related economic impact is associated with the firms that use freight transport to conduct business. To understand such impact, one needs to know the value of freight movements by direction, and how the economy uses such commodities to produce goods and services.